

حمل الآن

مجانا وحصريا

المراجعة رقم (1)

الترم الثاني



First Final Revision on algebra:**Remember Matrices and determinants****Order of the matrix**

If the number of rows of the matrix equals m and the number of its columns equals n , then the matrix is of order $m \times n$

For example : $A = \begin{pmatrix} 2 & 3 & -1 \\ 0 & -4 & 5 \end{pmatrix}$ is of order 2×3 and $a_{11} = 2, a_{12} = 3, \dots, a_{23} = 5$

Some special matrices

The row matrix Consists of one row and any number of columns, as :

$$(1 \quad 2 \quad 3)$$

The square matrix The number of its rows equals the number of its

columns, as : $\begin{pmatrix} 3 & 2 \\ -1 & 0 \end{pmatrix}$

The diagonal matrix It is a square matrix and all of its elements are zeroes except the elements of its main diagonal, at least one of them is

not equal to zero, as : $\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & -5 \end{pmatrix}$

The column matrix Consists of one column and any number of

rows, as : $\begin{pmatrix} 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 3 \\ -1 \\ 5 \end{pmatrix}$

The zero matrix 0 All of its elements are zeroes, as : $\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$

The unit matrix I It is a diagonal matrix and all elements of the main

diagonal equal one, as : $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

Matrix transpose The transpose of the matrix A is denoted by A^t and it is the resulting matrix from replacing the rows by columns and the columns by rows. **For example :** If $A = \begin{pmatrix} 5 & -2 & 1 \\ 3 & 4 & 6 \end{pmatrix}$, then $A^t = \begin{pmatrix} 5 & 3 \\ -2 & 4 \\ 1 & 6 \end{pmatrix}$

The symmetric and skew symmetric matrices If A is a square matrix, then :

- A is called a **symmetric** matrix if and only if $A = A^t$
- A is called a **skew symmetric** matrix if and only if $A = -A^t$

For example : $A = \begin{pmatrix} 1 & -2 & 5 \\ -2 & 3 & 6 \\ 5 & 6 & 4 \end{pmatrix}$ is a symmetric matrix because :

$$A^t = \begin{pmatrix} 1 & -2 & 5 \\ -2 & 3 & 6 \\ 5 & 6 & 4 \end{pmatrix} = A$$

$A = \begin{pmatrix} 0 & -3 & 2 \\ 3 & 0 & 4 \\ -2 & -4 & 0 \end{pmatrix}$ is a skew symmetric matrix because :

$$A^t = \begin{pmatrix} 0 & 3 & -2 \\ -3 & 0 & -4 \\ 2 & 4 & 0 \end{pmatrix} = -A$$

The equality of two matrices

The two matrices A and B are said to be equal if :

- They have the same order.
- Their corresponding elements are equal.

The concept of equality of two matrices is used in solving some equations. For example :

If $\begin{pmatrix} x & 2 & -3 \\ y-x & 1 & -2 \end{pmatrix} = \begin{pmatrix} 3 & 2 & -3 \\ 5 & 1 & -2 \end{pmatrix}$, then $x = 3$, $y - x = 5$, then $y = 8$

Multiplying a real number by a matrix

To multiply a real number by a matrix, we multiply the real number by each element of the elements of the matrix.

For example : If $A = \begin{pmatrix} -4 & 1 & 5 \\ 2 & -3 & -1 \end{pmatrix}$, then $2A = \begin{pmatrix} -8 & 2 & 10 \\ 4 & -6 & -2 \end{pmatrix}$

Adding and subtracting matrices

If A and B are two matrices of the same order $m \times n$, then :

- $A + B$ is a matrix of order $m \times n$ and each element in it is the sum of the two corresponding elements in A and B
- $A - B = A + (-B)$ is a matrix of order $m \times n$ and each element in it is the sum of the two corresponding elements in A and $-B$

For example : If $A = \begin{pmatrix} 3 & -2 & 2 \\ -2 & 5 & -4 \end{pmatrix}$, $B = \begin{pmatrix} 0 & -3 & 4 \\ -1 & 2 & -2 \end{pmatrix}$

Notice that $A, B, A + B, A - B$ all of them are of the same order 2×3

$$A - B = \begin{pmatrix} 3 & -2 & 2 \\ -2 & 5 & -4 \end{pmatrix} + \begin{pmatrix} 0 & 3 & -4 \\ 1 & -2 & 2 \end{pmatrix} = \begin{pmatrix} 3 & 1 & -2 \\ -1 & 3 & -2 \end{pmatrix}$$

Multiplying matrices

If A is a matrix of order $m \times \ell$ and B is a matrix of order $r \times n$, then : AB is possible if $\ell = r$ (i.e. The number of columns of A = the number of rows of B) and the resulted matrix from the product is of order $m \times n$

For example : If $A = \begin{pmatrix} 2 & -1 & 0 \\ 3 & 1 & -2 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 2 \\ -1 & 0 \\ 4 & 5 \end{pmatrix}$, then the number of

columns of A = the number of rows of $B = 3 \therefore AB$ is possible and of order

$$2 \times 2, \text{ where } AB = \begin{pmatrix} 2 & -1 & 0 \\ 3 & 1 & -2 \end{pmatrix} \begin{pmatrix} 3 & 2 \\ -1 & 0 \\ 4 & 5 \end{pmatrix} =$$

$$\begin{pmatrix} (2)(3) + (-1)(-1) + (0)(4) & (2)(2) + (-1)(0) + (0)(5) \\ (3)(3) + (1)(-1) + (-2)(4) & (3)(2) + (1)(0) + (-2)(5) \end{pmatrix} = \begin{pmatrix} 7 & 4 \\ 0 & -4 \end{pmatrix}$$

Remarks $(A + B)^t = A^t + B^t$. $(AB)^t = B^t A^t$

Determinants

If A is a square matrix of order 2×2 where $A = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$, then :

$$|A| = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} = a_{11}a_{22} - a_{21}a_{12}$$

For example : $\begin{vmatrix} 4 & -7 \\ 2 & 6 \end{vmatrix} = (4 \times 6) - (2 \times (-7)) = 24 + 14 = 38$

If A is a square matrix of order 3×3 where $A = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$, then :

$$|A| = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$

For example : $\begin{vmatrix} 2 & 3 & -1 \\ -2 & 0 & 4 \\ 1 & 1 & -3 \end{vmatrix} = 2(0 \times (-3) - 1 \times 4) - 3(-2 \times (-3) - 1 \times 4) - 2 \times 1 - 1 \times 0 = 2(0 - 4) - 3(6 - 4) - 2 - 0 = -8 - 6 + 2 = -12$

Notice that

It is possible to expand the determinant using the elements of any row or

column by using the rule of signs :

$$\begin{vmatrix} + & - & + \\ - & + & - \\ + & - & + \end{vmatrix}$$

- The value of the determinant of the triangular matrix = the product of the elements of its main diagonal.

i.e. $\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ 0 & a_{22} & a_{23} \\ 0 & 0 & a_{33} \end{vmatrix} = a_{11}a_{22}a_{33}$ **For example :** $\begin{vmatrix} 2 & -1 & 5 \\ 0 & 3 & -2 \\ 0 & 0 & -1 \end{vmatrix} = 2 \times 3 \times (-1) = -6$

Finding the area of a triangle $\triangle XYZ$ using determinants

- If $X = (a, b)$, $Y = (c, d)$ and $Z = (e, f)$, then :

the area of $\triangle XYZ$ is $|A|$ where $A = \frac{1}{2} \begin{vmatrix} a & b & 1 \\ c & d & 1 \\ e & f & 1 \end{vmatrix}$

Notice that: If $|A| = 0$, then the points X, Y and Z are collinear.

For example : If XYZ is a triangle where $X = (1, 2)$, $Y = (3, -4)$ and $Z = (-2, 3)$, then $A = \frac{1}{2} \begin{vmatrix} 1 & 2 & 1 \\ 3 & -4 & 1 \\ -2 & 3 & 1 \end{vmatrix}$ by using the elements of the 3rd column, you get :

$$A = \frac{1}{2} [(9 - 8) - (3 + 4) + (-4 - 6)] = \frac{1}{2} (1 - 7 - 10) = -8$$

∴ The area of $\Delta XYZ = |A| = |-8| = 8$ square units.

The multiplicative inverse of a 2×2 matrix

If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, then the multiplicative inverse of the matrix A which is denoted by the symbol A^{-1} is defined (existed) when the determinant of

$$A \neq 0 \text{ i.e. } |A| = \Delta \neq 0 \text{ and : } A^{-1} = \frac{1}{\Delta} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix} \text{ where } AA^{-1} = A^{-1}A = I$$

For example : If $A = \begin{pmatrix} -2 & 2 \\ 3 & -4 \end{pmatrix}$, then A^{-1} is defined because $\Delta \neq 0$ where

$$\Delta = \begin{vmatrix} -2 & 2 \\ 3 & -4 \end{vmatrix} = -2 \times (-4) - 3 \times 2 = 2$$

$$\therefore A^{-1} = \frac{1}{\Delta} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix} = \frac{1}{2} \begin{pmatrix} -4 & -2 \\ -3 & -2 \end{pmatrix} = \begin{pmatrix} -2 & -1 \\ 3 & -1 \end{pmatrix}$$

Remember Solving equations

First Solving two simultaneous equations in two variables

It is possible to solve the two simultaneous equations :

$$a_1x + b_1y = c_1, \quad a_2x + b_2y = c_2 \text{ by using :}$$

(1) The determinants (Cramer's rule).

(2) The multiplicative inverse of a matrix.

First By using determinants (Cramer's rule)

We find the values of the determinants :

$$\Delta = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}, \Delta_x = \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}, \Delta_y = \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}, \text{ then } x = \frac{\Delta_x}{\Delta}, \quad y = \frac{\Delta_y}{\Delta}$$

For example: If $2x - 3y = 4, 3x + 4y = 23$, **then :** $\Delta = \begin{vmatrix} 2 & -3 \\ 3 & 4 \end{vmatrix} = 8 + 9 = 17$

$$\Delta_x = \begin{vmatrix} 4 & -3 \\ 23 & 4 \end{vmatrix} = 16 + 69 = 85, \quad \Delta_y = \begin{vmatrix} 2 & 4 \\ 3 & 23 \end{vmatrix} = 46 - 12 = 34$$

$$\therefore X = \frac{\Delta_x}{\Delta} = \frac{85}{17} = 5, \quad y = \frac{\Delta_y}{\Delta} = \frac{34}{17} = 2$$

Second By using the multiplicative inverse of the matrix We write the two equations in the form of the matrix equation : $\begin{pmatrix} a_1 & b_1 \\ a_2 & b_2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} c_1 \\ c_2 \end{pmatrix}$ i.e. In the form $AX = C$ where $A = \begin{pmatrix} a_1 & b_1 \\ a_2 & b_2 \end{pmatrix}, X = \begin{pmatrix} x \\ y \end{pmatrix}$ and $C = \begin{pmatrix} c_1 \\ c_2 \end{pmatrix}$, then $X = A^{-1}C$ and from that we deduce the values of X and y

For example : If $2x - 3y = 4, 3x + 4y = 23$, then $A = \begin{pmatrix} 2 & -3 \\ 3 & 4 \end{pmatrix}, X = \begin{pmatrix} x \\ y \end{pmatrix}$ and $C = \begin{pmatrix} 4 \\ 23 \end{pmatrix}$ $\therefore X = A^{-1}C$ where $\Delta = |A| = \begin{vmatrix} 2 & -3 \\ 3 & 4 \end{vmatrix} = 8 + 9 = 17 \therefore A^{-1} = \frac{1}{17} \begin{pmatrix} 4 & 3 \\ -3 & 2 \end{pmatrix}$

$$\therefore X = \frac{1}{17} \begin{pmatrix} 4 & 3 \\ -3 & 2 \end{pmatrix} \begin{pmatrix} 4 \\ 23 \end{pmatrix} \quad \therefore \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{17} \begin{pmatrix} 85 \\ 34 \end{pmatrix} = \begin{pmatrix} 5 \\ 2 \end{pmatrix} \therefore x = 5 \text{ and } y = 2$$

Second To solve the equations : $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2$ and $a_3x + b_3y + c_3z = d_3$ We find the values of the determinants :

$$\Delta = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \Delta_x = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, \Delta_y = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix} \text{ and } \Delta_z = \begin{vmatrix} a_1 & b_1 & d_1 \\ a_2 & b_2 & d_2 \\ a_3 & b_3 & d_3 \end{vmatrix}$$

$$\text{, then } x = \frac{\Delta_x}{\Delta}, \quad y = \frac{\Delta_y}{\Delta}, \quad z = \frac{\Delta_z}{\Delta}$$

For example : If $2x + 3y - z = 1, 3x + 5y + 2z = 8, x - 2y - 3z = -1$,

$$\Delta = \begin{vmatrix} 2 & 3 & -1 \\ 3 & 5 & 2 \\ 1 & -2 & -3 \end{vmatrix} = 2(-15 + 4) - 3(-9 - 2) + (-1)(-6 - 5) = -22 + 33 + 11 = 22$$

$$\Delta_x = \begin{vmatrix} 1 & 3 & -1 \\ 8 & 5 & 2 \\ -1 & -2 & -3 \end{vmatrix} = 1(-15 + 4) - 3(-24 + 2) + (-1)(-16 + 5) = 66$$

$$\Delta_y = \begin{vmatrix} 2 & 1 & -1 \\ 3 & 8 & 2 \\ 1 & -1 & -3 \end{vmatrix} = 2(-24 + 2) - 1(-9 - 2) + (-1)(-3 - 8) = -44 + 11 + 11 = -22$$

$$\Delta_z = \begin{vmatrix} 2 & 3 & 1 \\ 3 & 5 & 8 \\ 1 & -2 & -1 \end{vmatrix} = 2(-5 + 16) - 3(-3 - 8) + 1(-6 - 5) = 22 + 33 - 11 = 44$$

$$\therefore x = \frac{\Delta_x}{\Delta} = \frac{66}{22} = 3, \quad y = \frac{\Delta_y}{\Delta} = \frac{-22}{22} = -1, \quad z = \frac{\Delta_z}{\Delta} = \frac{44}{22} = 2$$

Remember Solving linear inequalities.

Solving first degree inequalities in two variables

The boundary line $L: 2x + 3y = 6$ divides the plane

into two halves S_1 and S_2 where $S_1 \cup S_2 \cup L =$

the set of points of the plane, and :

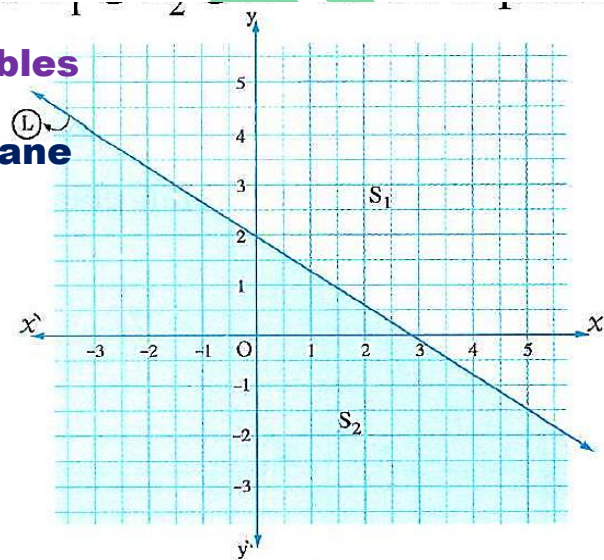
- The solution set of the inequality :

$$2x + 3y \geq 6 \quad \text{is } L \cup S_1$$

- The solution set of the inequality :

$$2x + 3y \leq 6 \quad \text{is } L \cup S_2$$

Notice that : The boundary line L is represented by a solid line because the set of its points is a subset of the solution set.

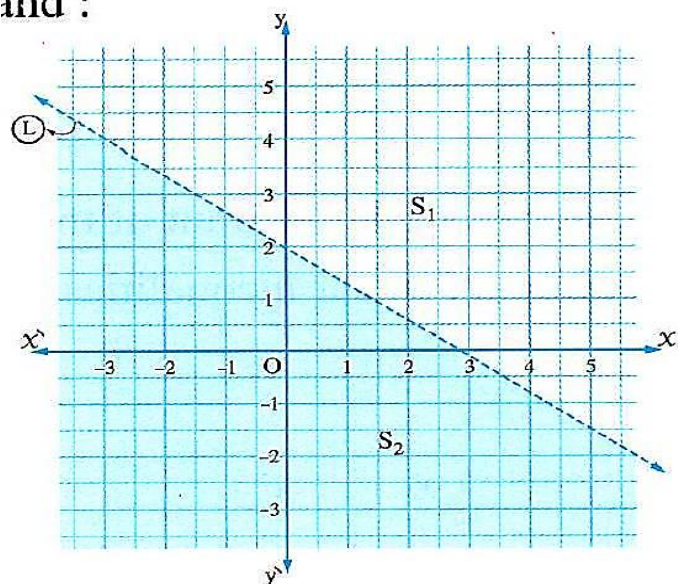


- The solution set of the inequality : and :

$$2x + 3y > 6 \quad \text{is } S_1$$

- The solution set of the inequality:

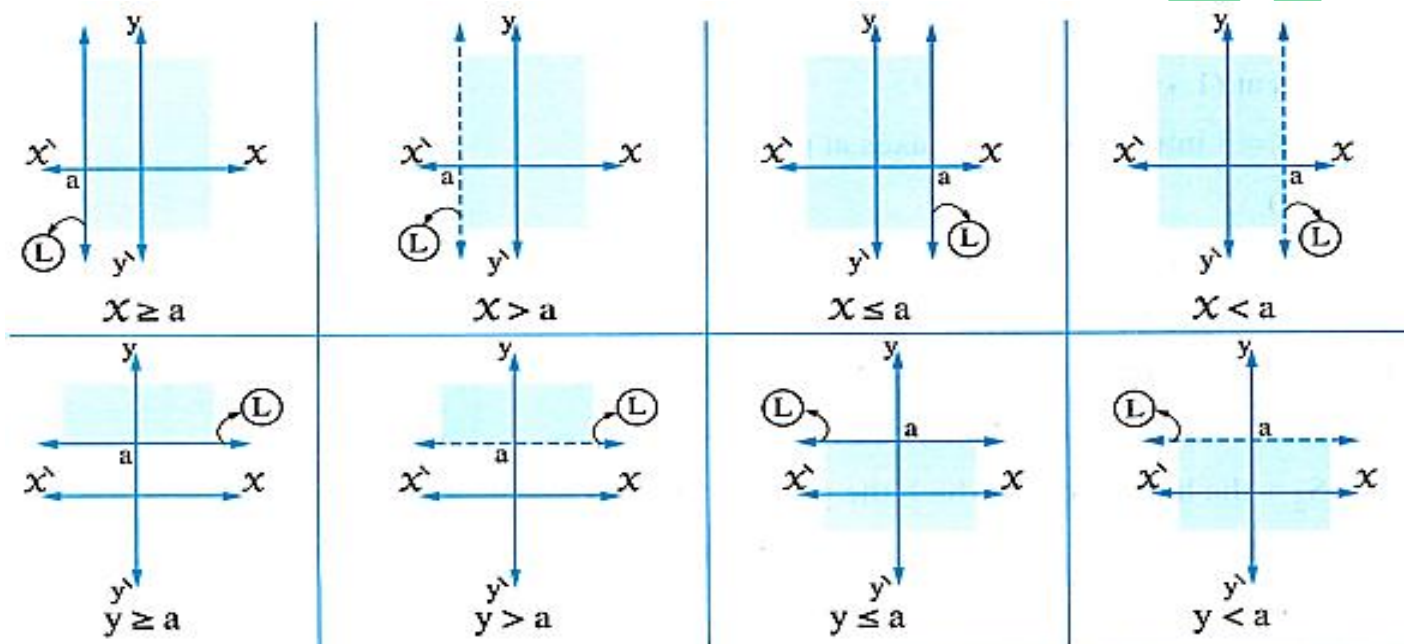
$$2x + 3y < 6 \quad \text{is } S_2$$



Notice that :

The boundary line L is represented by a dashed line because the set of its points is not a subset of the solution set.

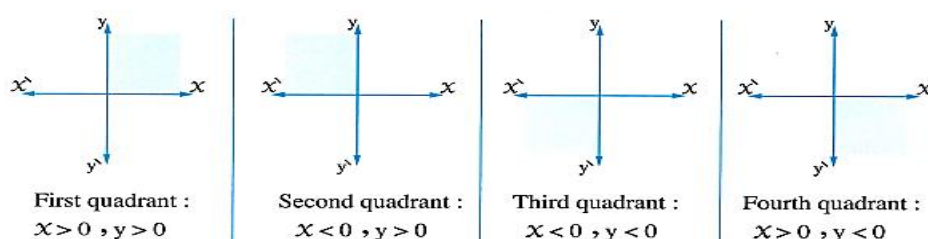
Remark - The following figures are the graphical representation of the solution sets of the given inequalities under each figure in $\mathbb{R} \times \mathbb{R}$

**Solving systems of linear inequalities graphically**

To find the graphical solution of two inequalities or more :

- (1) Determine the region of the solution of each inequality , as $S_1, S_2, S_3, \dots$
- (2) Determine the common region between $S_1, S_2, S_3, \dots$ by finding $S_1 \cap S_2 \cap S_3 \dots$, then it is the solution set of the given inequalities.

Remark We can describe each quadrant of the four quadrants of the orthogonal cartesian plane by using a system of linear inequalities as the following :



Example Solve the following system of linear inequalities in $\mathbb{R} \times \mathbb{R}$ graphically : $x \leq 1$, $x + y < 3$

Solution

$L_1: X = 1$ is parallel to the y -axis and intersects the x -axis at $(1, 0)$,

$L_2: x + y = 3$ intersects the two axes at $(3, 0)$ and $(0, 3)$ The

x	0	3
y	3	0

solution set of the inequality: $x \leq 1$ is S_1

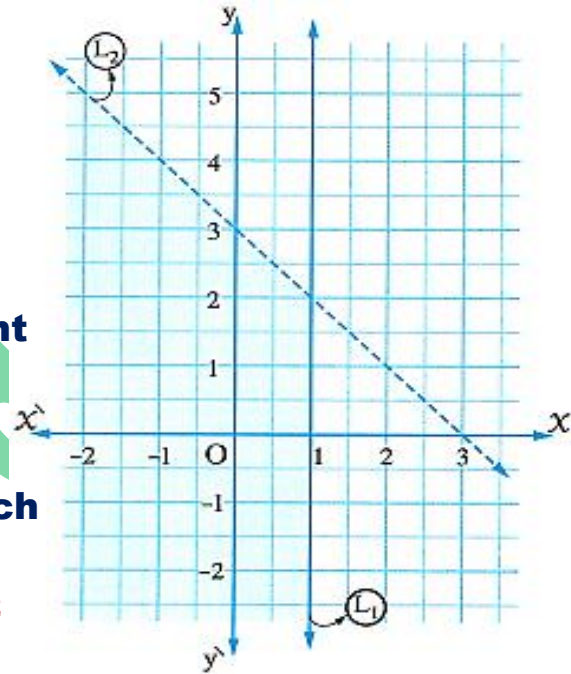
where $S_1 = L_1 \cup$ the half plane in which the point

$(0, 0)$ lies , the solution set of the inequality:

$x + y < 3$ is S_2 where $S_2 =$ the half plane in which

the point $(0, 0)$ lies $\therefore$ The solution set $= S_1 \cap S_2$

and it is represented by the shaded region.



Linear programming and optimization (For example) :

If the opposite figure represents the solution set of the system of the

inequalities: $x \geq 0, y \geq 0$, $L_1: x + 2y \leq 8$ And $L_2: 3x + 2y \leq 12$, then to find

the point (x, y) from

the solution set that

makes P maximum

where $P = 50x + 75y$,

we find :

$$[P]_A = 50(4) + 75(0) = 200$$

$$[P]_B = 50(2) + 75(3) = 325 \quad [P]_C = 50(0) + 75(4) = 300 \quad [P]_O = 50(0) + 75(0) = 0$$

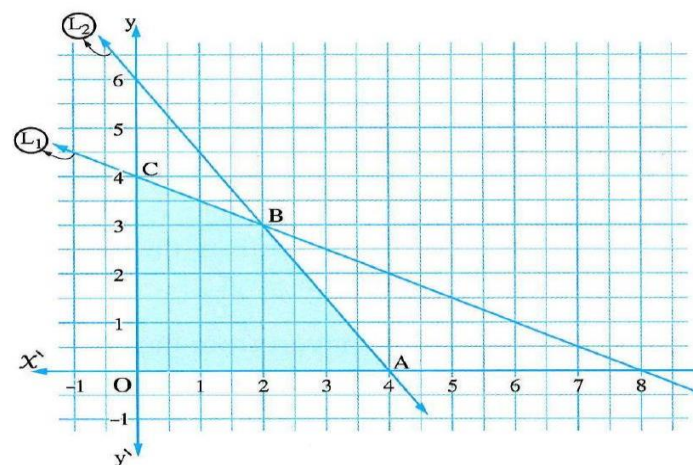
$\therefore$ The maximum value of the objective function is **325** at the point $B(2, 3)$

$$L_1: x + 2y \leq 8$$

x	0	8
y	4	0

$$L_2: 3x + 2y \leq 12$$

x	0	4
y	6	0



[1] Choose the correct answer from the given once :

(1) If $B = \begin{pmatrix} 2 & 4 \\ 3 & 1 \end{pmatrix}$, $AB = I$, then the matrix $A = \dots\dots\dots$

(a) $\begin{pmatrix} \frac{1}{5} & \frac{2}{5} \\ \frac{3}{10} & \frac{1}{10} \end{pmatrix}$

(b) $\begin{pmatrix} -\frac{1}{10} & \frac{2}{5} \\ \frac{3}{10} & -\frac{1}{5} \end{pmatrix}$

(c) $\begin{pmatrix} \frac{1}{10} & -\frac{2}{5} \\ -\frac{3}{10} & \frac{1}{5} \end{pmatrix}$

(d) $\begin{pmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{2}{5} & -\frac{1}{10} \end{pmatrix}$

(2) If B is a matrix in the order 3×2 then, $2B$ is a matrix in the order

(a) 6×4

(b) 3×4

(c) 6×2

(d) 3×2

(3) If A is a skew symmetric matrix in the order 3×3 and $a_{13} = 6$, which of the following is correct

(a) $a_{31} = -6$

(b) $a_{11} = 1$

(c) $a_{31} = 6$

(d) $a_{32} + a_{23} = 12$

(4) If $A = \begin{pmatrix} 0 & 2 \\ 3 & -4 \end{pmatrix}$, $mA = \begin{pmatrix} 0 & 3c \\ 2 & 24 \end{pmatrix}$, then $c + b - m =$

(a) -19

(b) -7

(c) 7

(d) 16

(5) The matrix $\begin{pmatrix} x & 4 \\ 2 & x-2 \end{pmatrix}$ has no multiplicative inverse at $x =$

(a) 4, -2

(b) -4, 2

(c) -4, -2

(d) 4, 2

(6) If $\begin{vmatrix} x & 2 & 1 \\ l-3 & y & 3 \\ 0 & 0 & z \end{vmatrix} = xyz$ where x, y, z are non-zero numbers then $l =$

(a) 3

(b) -3

(c) 6

(d) xy

(7) If $A = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$, $B = \begin{pmatrix} -3 & 5 \end{pmatrix}$, then $BA =$

(a) $\begin{pmatrix} -9 \\ 10 \end{pmatrix}$

(b) $\begin{pmatrix} -9 & 10 \end{pmatrix}$

(c) $\begin{pmatrix} -9 & 15 \\ 6 & 10 \end{pmatrix}$

(d) (1)

(8) The point which belongs to the solution set of the inequality : $x + y \leq 3$ is.....

(a) (1, 3)

(b) (2, -3)

(c) (2, 3)

(d) (1, 4)

(9) The point which belongs to the solution set of the inequality:

$x > 3, y < 1, x + y \leq 5$ is.....

(a) (6, -2)

(b) (1, -2)

(c) (4, 4)

(d) (3, -2)

(10) If the matrix A of order 3×4 , then the row contains elements.

- (a) 3 (b) 4 (c) 7 (d) 12

(11) If A is a matrix of order 3×1 , B is a matrix of order 1×3 , then : AB is a matrix of order

- (a) 3×1 (b) 1×1 (c) 3×3 (d) 1×3

(12) $\begin{pmatrix} -3 & -1 \\ 2 & 1 \end{pmatrix} + \begin{pmatrix} 4 & 1 \\ -2 & 0 \end{pmatrix} = \dots\dots\dots$

- (a) $\square$ (b) $\begin{pmatrix} -1 & 1 \\ 0 & 1 \end{pmatrix}$ (c) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (d) $\begin{pmatrix} 1 & 0 \\ 4 & 1 \end{pmatrix}$

(13) If $A = \begin{pmatrix} 2 & 1 \\ 5 & 3 \end{pmatrix}$, then : $A^{-1} = \dots\dots\dots$

- (a) $\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}$ (b) $\begin{pmatrix} -2 & 1 \\ 5 & -3 \end{pmatrix}$ (c) $\begin{pmatrix} -2 & 5 \\ 1 & -3 \end{pmatrix}$ (d) $\begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix}$

(14) If $\begin{vmatrix} 2 & 1 \\ 4 & x \end{vmatrix} = 0$, then $x =$

- (a) 4 (b) 3 (c) 2 (d) 1

(15) If $\begin{pmatrix} x \\ 6 \end{pmatrix} - \begin{pmatrix} 1 \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$, then $x + y = \dots\dots\dots$

- (a) 1 (b) 4 (c) 5 (d) 3

(16) The region representing the solution set of the two inequalities : $y > 0, x < 0$ in $\mathbb{R} \times \mathbb{R}$ in the quadrant

- (a) first. (b) second. (c) third. (d) fourth.

(17) The point which belongs to solution set of the two inequalities :

$x > 2, y > 1$ together is

- (a) (1, 2) (b) (2, 1) (c) (3, 1) (d) (3, 2)

(18) If $\begin{pmatrix} x+1 & 3 \\ 5 & y-2 \end{pmatrix} = \begin{pmatrix} 7 & 3 \\ 5 & 1 \end{pmatrix}$, then $x + y =$

- (a) 5 (b) 6 (c) 7 (d) 9

(19) The value of $\begin{vmatrix} 3 & 0 & 0 \\ 2 & 5 & 0 \\ 1 & 4 & 2 \end{vmatrix} = \dots\dots\dots$

- (a) 8 (b) 6 (c) 15 (d) 30

(20) If the matrix $\begin{pmatrix} x & 4 \\ 9 & x \end{pmatrix}$ has no multiplicative invers, then $x = \dots\dots\dots$

(a) 6

(b) -6

(c) ± 6

(d) 13

(21) If A is a symmetric matrix then $A - A^t = \dots\dots\dots$

(a) 0

(b) A (c) A^t (d) $2A$

(22) If $\begin{vmatrix} x & 3 \\ 1 & 2 \end{vmatrix} = 7$, then $x = \dots\dots\dots$

(a) 1

(b) 2

(c) 3

(d) 5

(23) If A is a matrix of order 2×3 and B is a matrix of order 3×3 , then the order of matrix $AB = \dots\dots\dots$

(a) 2×2 (b) 2×3 (c) 3×2 (d) 3×3

(24) The point which belongs to the solution set of the inequalities $x > 2, y > 1$ and $x + y \geq 3$ is

(a) (2, 1)

(b) (2, 2)

(c) (3, 2)

(d) (3, 1)

(25) The points (3, 5) and (1, 5) belong to the solution set of the inequality $x + y \dots\dots\dots 8$

(a) $>$ (b) $<$ (c) $\geq$ (d) $\leq$

(26) If $A = \begin{pmatrix} 3 & -2 \\ 5 & 1 \end{pmatrix}$ and if $AB = I$, then the matrix $B = \dots\dots\dots$

(a) $\frac{1}{13} \begin{pmatrix} 3 & -2 \\ 5 & 1 \end{pmatrix}$ (b) $\frac{1}{13} \begin{pmatrix} 1 & 2 \\ -5 & 3 \end{pmatrix}$ (c) $\frac{1}{13} \begin{pmatrix} 1 & -2 \\ -5 & 3 \end{pmatrix}$ (d) $\frac{1}{13} \begin{pmatrix} -3 & 5 \\ -2 & -1 \end{pmatrix}$

(27) The possible value of a which makes the determinant $\begin{vmatrix} 1 & 3 & -1 \\ -2 & a & 3 \\ 5 & 6 & -2 \end{vmatrix} = 0$ is $\dots\dots\dots$

(a) 2

(b) -2

(c) -9

(d) 9

(28) If L, M are the two roots of the equation : $x^2 - 7x + 2 = 0$, then the value of $\begin{vmatrix} L^2 M & -L^2 \\ M^2 & M \end{vmatrix} = \dots\dots\dots$

(a) zero

(b) 4

(c) 8

(d) 16

(29) If the area of the triangle whose vertices are $(k, 0), (4, 0), (0, 2)$ equals 4 square units , then $k =$

- (a) zero or 8 (b) -4 or 4 (c) zero or -8 (d) 8 or -8

(30) The point which belongs to the solution set of the inequalities $x \geq 1, y \geq 2, x + y \geq 5$ and makes the objective function $R = 2x + y$ as small as possible from the following point is

- (a) (0, 5) (b) (4, 3) (c) (3, 2) (d) (1, 4)

(31) When solving the two equations : $ax + by = 4, cx + dy = 2$ its found that the multiplicative inverse of the matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} -1 & 3 \\ 1 & -2 \end{pmatrix}$, then $2x + 3y =$

- (a) 2 (b) 3 (c) 4 (d) -2

(32) If $\begin{vmatrix} \sin \theta & 0 & 0 \\ 2 & \csc \theta & 0 \\ 1 & 3 & x \end{vmatrix} + \begin{vmatrix} \sin \theta & \cos \theta \\ -\cos \theta & \sin \theta \end{vmatrix} = 0$, then $x =$

- (a) -1 (b) zero (c) 1 (d) $\sin \theta$

(33) The area of the triangle whose vertices are $A(1, -2), B(3, 2), C(5, 3)$ equals square unit.

- (a) 15 (b) 12 (c) 3 (d) 6

(34) If $\begin{pmatrix} 2 & 1 \\ 3 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 9 \\ 6 \end{pmatrix}$, then $x + y = \dots \dots \dots$

- (a) 3 (b) 4 (c) 5 (d) 6

(35) If $A = \begin{pmatrix} 3 & 2 \\ 7 & 5 \end{pmatrix}$, then $A^{-1} = \dots \dots \dots$

- (a) $\begin{pmatrix} 3 & 2 \\ 7 & 5 \end{pmatrix}$ (b) $\begin{pmatrix} 5 & -2 \\ -7 & 3 \end{pmatrix}$ (c) $\begin{pmatrix} -3 & 7 \\ 2 & -5 \end{pmatrix}$ (d) 3 I

(36) If $\begin{vmatrix} x & 9 \\ 4 & x \end{vmatrix} = \begin{vmatrix} 2 & 1 \\ 10 & 5 \end{vmatrix}$ then $x =$

- (a) 6 (b) ± 6 (c) 2 (d) 5

(37) The point which belongs to the solution set of the inequalities: $x + 3y < 6, 2x + y < 4$ from the following points is

(a) $(1, -4)$ (b) $(2, 1)$ (c) $(1, 2)$ (d) $(3, -1)$

(38) The solution set of the inequalities : $x \geq 0, y \geq 0, x + y \leq 4$ is the triangle whose vertices are the points

(a) $(0, 4), (0, 0), (4, 4)$ (b) $(0, 0), (4, 0), (0, 4)$ (c) $(4, 4), (0, 4), (4, 0)$ (d) $(0, 0), (4, 0), (4, 4)$

Second Essay Questions

Answer the following questions :

(1) Solve the following system of linear inequalities in $\mathbb{R} \times \mathbb{R}$ graphically :

$$x \geq 0, y \geq 0, y + 2x \leq 6$$

(2) Find the S.S. of the following system of inequalities :

$x \geq 0, y \geq 0, x + 2y \leq 8, 3x + 2y \leq 12$, then find the solution set of the values (x, y) which makes P as great as possible where $P = 50x + 75y$

(3) Find the maximum value of the objective function $P = 5x + 2y$ under conditions : $x \geq 0, y \geq 0, x + y \leq 7, x + 2y \leq 10$

Model Answer on Algebra:

(1) (b) $\because AB = I \therefore A = B^{-1} = \frac{1}{\Delta} \begin{pmatrix} 1 & 1 \\ -3 & 2 \end{pmatrix}$ $\because \Delta = \begin{vmatrix} 2 & 4 \\ 3 & 1 \end{vmatrix} = 2 - 12 = -10$ Then $A = \frac{1}{-10} \begin{pmatrix} 1 & -4 \\ -3 & 2 \end{pmatrix} = \begin{pmatrix} -\frac{1}{10} & \frac{4}{10} \\ \frac{3}{10} & -\frac{2}{10} \end{pmatrix} =$	(2) (d) $\because B_{3 \times 2}$ $\therefore 2B_{3 \times 2}$ also.	(3) © $\because A$ is a skew symmetric $\therefore a_{13} = a_{31} = 6$
(4) $\because mA = \begin{pmatrix} 0 & 2m \\ 3m & -4m \end{pmatrix} = \begin{pmatrix} 0 & 3c \\ 2b & 24 \end{pmatrix} \therefore 2b = -6 \therefore -4m = 24 \therefore m = -6 \therefore 3c = 2m = -12 \Rightarrow c = -4 \therefore b = -9 \therefore c + b - m = -4 - 9 + 6 = -7$	(5) $\begin{vmatrix} x & 4 \\ 2 & x-2 \end{vmatrix} = 0 \therefore x^2 - 2x - 8 = 0 \therefore (x - 4)(x + 2) = 0$ $\therefore x = 4, -2$	(6) We can solve by using first Column. $\therefore x(yz - 0) - (L - 3)(2z - 0) = xyz \therefore xyz + (3 - L)(2z) = xyz \therefore (3 - L)(2z) = 0 \Rightarrow L = 3$ (a)
(7) $BA = (-3 \ 5) \begin{pmatrix} 3 \\ 2 \end{pmatrix} = (-9 + 10) = (1)$ (d)	(8) $\because x + y \leq 3$ by substituting the point That satisfying the inequality $(22 - 3) \Rightarrow 2 + (-3) \leq 3$	(9) $x > 3, y < 1 \dots x + y \leq 5$ by substituting (a) $(6, -2) \Rightarrow 6 + -2 \leq 5, 6 > 3, -2 < 1$
(10) (b) The row Contains elements = number of columns = 4.	(11) (c) $A_{3 \times 1} \times B_{1 \times 3} = AB_{3 \times 3}$	(12) $\begin{pmatrix} -3 + 4 & -1 + 1 \\ 2 + (-2) & 1 + 0 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$ (c)
(13) (d) $\because \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix} = 6 - 5 =$	(14) $\begin{vmatrix} 2 & 1 \\ 4 & x \end{vmatrix} = 2x - 4 = 0$	[15] $\therefore \begin{pmatrix} x-1 \\ 6-y \end{pmatrix} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} \Rightarrow x - 1 = 3 \Rightarrow x = 4$ $6 - y = 5 \Rightarrow y = 1$

$1 = \Delta \therefore A^{-1} =$ $\frac{1}{\Delta} \begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix} = \begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix}$	$\Rightarrow x = 2 \quad \textcircled{C}$	$\therefore x + y = 4 + 1 = 5$
(16) (b) Second (17) $x > 2, y > 1$ (d) (3, 2)	(18) $\therefore \begin{matrix} x+1=7 \\ y-2=1 \end{matrix} \Rightarrow \begin{matrix} x=6 \\ y=3 \end{matrix} \Rightarrow x+y=9$ (d)	(19) $3 \times 5 \times 2 = 30$ (d)
(20) $\therefore \Delta = \begin{vmatrix} x & 4 \\ 9 & x \end{vmatrix} = 0 \Rightarrow \therefore$ $x^2 - 36 = 0 \quad \textcircled{C} \quad \therefore x =$ ± 6	(21) $A - A^t = 0$ (a)	(22) $\therefore 2x - 3 = 7 \therefore$ $2x = 10 \therefore x = 5 \quad \textbf{(d)}$
(23) $A_{2 \times 3} \times B_{3 \times 3} = A_{2 \times 3}$ (b)	(24) $x > 2, y > 1 \quad x + y \geq 3$ (c) (3, 2)	(25) $x + y \dots \leq .8$ (d)
(26) $\therefore AB = I \therefore B = A^{-1} \therefore$ $\therefore \Delta = \begin{vmatrix} 3 & -2 \\ 5 & 1 \end{vmatrix} = 13 \therefore B =$ $A^{-1} = \frac{1}{4} \begin{pmatrix} 1 & 2 \\ -5 & 3 \end{pmatrix} =$ $\frac{1}{13} \begin{pmatrix} 1 & 2 \\ -5 & 3 \end{pmatrix}$	(27) $\therefore -2a - 18 + 33 + 12 +$ $5a = 0 \therefore 3a + 27 = 0 \therefore a =$ $\frac{-27}{3} = -9$	(28) $\therefore L + m = \frac{-7}{1} = 7$ and $Lm = \frac{2}{1} = 2 \therefore \begin{vmatrix} L^2m & -L^2 \\ M^2 & M \end{vmatrix} =$ $L^2m^2 + L^2m^2 = (2)^2 +$ $(2)^2 = 8 \quad \textcircled{C}$
(29) $A = \frac{1}{2} (k-4)(2) = 4$ $\therefore k - 4 = 4 \quad \textbf{or} \quad k - 4 =$ $-4 \quad k = 8 \quad \textbf{or} \quad k = 0$ (a)	(30) $x \geq 1 \quad y \geq 2 \quad x + y \geq 5$ The points (b), (c), (d) satisfying inequalities but the minimum value at (d) (1, 4) $R = 2(1) + 4 = 6$	(31) $\therefore x = A^{-1}B \therefore \begin{pmatrix} x \\ y \end{pmatrix} =$ $\begin{pmatrix} -1 & 3 \\ 1 & -2 \end{pmatrix} \begin{pmatrix} 4 \\ 2 \end{pmatrix} = \begin{pmatrix} -4+6 \\ 4-4 \end{pmatrix} =$ $\begin{pmatrix} 2 \\ 0 \end{pmatrix} \Rightarrow 2x + 3y =$ $2(2) + 3(0) = 4 \quad \textbf{(C)}$
(32) $\therefore \sin \theta \cdot \csc \theta \cdot x +$ $\sin^2 \theta + \cos^2 \theta = 0 \therefore x +$ $1 = 0 \therefore x = -1 \quad \textbf{(a)}$	(33) $\therefore \text{area} = \frac{1}{2} \begin{vmatrix} 1 & -2 & 1 \\ 3 & 2 & 1 \\ 5 & 3 & 1 \end{vmatrix} = \frac{1}{2} (2$ $= 3 \quad \textbf{(c)}$	(34) $\therefore \begin{pmatrix} 2x+y \\ 3x-y \end{pmatrix} = \begin{pmatrix} 9 \\ 6 \end{pmatrix} \Rightarrow \therefore$ $2x + y = 9$ $\therefore 3x - y = 6 \therefore \textbf{Mode} \rightarrow$

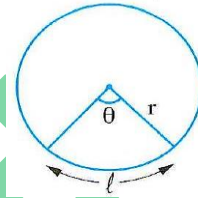
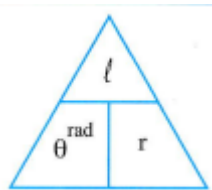
		$5 \rightarrow 1 \therefore x = 3$ and $y = 3$ $\therefore x + y = 3 + 3 = 6$ (d)
(35) (b) $\therefore \Delta = \begin{vmatrix} 3 & 2 \\ 7 & 5 \end{vmatrix} = 15 - 14 = 1$ $\therefore A^{-1} = \begin{pmatrix} 5 & -2 \\ -7 & 3 \end{pmatrix}$	(36). $x^2 - 36 = 10 - 10 \Rightarrow x^2 - 36 = 0$ $\therefore x^2 = 36 \Rightarrow x = \pm 6$ (b)	(37) $x + 3y < 6, 2x + y < 4$ (a) $(1, -4)$ satisfying the two inequalities.
(38) $x \geq 0, y \geq 0, x + y \leq 4$ (b) $(0, 0), (4, 0), (0, 4)$ satisfying the inequalities by substituting.		

Second Final Revision on trigonometry:

Remember The relation between the radian measure and the degree measure of the angle

If θ^{rad} and X° are the radian measure and the degree measure of a central angle in a circle of radius length r subtends an arc of length ℓ , then :

$$\theta^{\text{rad}} = \frac{\ell}{r}, \text{ then } \begin{cases} \ell = \theta^{\text{rad}} r \\ r = \frac{\ell}{\theta^{\text{rad}}} \end{cases}$$



Notice that

To convert from the radian measure (θ^{rad}) of the angle to the degree measure (x°) and vice versa, we use the relation :

$$\frac{\theta^{\text{rad}}}{\pi} = \frac{x^\circ}{180^\circ}, \text{ then } \begin{cases} x^\circ = \theta^{\text{rad}} \times \frac{180^\circ}{\pi} \\ \text{(to convert from the radian measure to the degree measure)} \\ \theta^{\text{rad}} = x^\circ \times \frac{\pi}{180^\circ} \\ \text{(to convert from the degree measure to the radian measure)} \end{cases}$$

Remember The trigonometric identities

If the terminal side of the directed angle of measure θ in the standard position intersects the unit circle at the point (x, y) , then :

$$\sin \theta = y, \quad \cos \theta = x, \quad \tan \theta = \frac{y}{x}$$

The relation between θ and $-\theta$

$$\sin(-\theta) = -\sin \theta, \quad \cos(-\theta) = \cos \theta,$$

$$\tan(-\theta) = -\tan \theta, \quad \csc(-\theta) = -\csc \theta$$

$$\sec(-\theta) = \sec \theta, \quad \cot(-\theta) = -\cot \theta$$

Reciprocals of the trigonometric functions

$$\sec \theta = \frac{1}{\cos \theta}, \quad \csc \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}, \quad \cos \theta = \frac{1}{\sec \theta}$$

$$\sin \theta = \frac{1}{\csc \theta}, \quad \tan \theta = \frac{1}{\cot \theta}$$

Pythagoras identity

(1) $\sin^2 \theta + \cos^2 \theta = 1$, then $\begin{cases} \sin^2 \theta = 1 - \cos^2 \theta \\ \cos^2 \theta = 1 - \sin^2 \theta \end{cases}$

(2) $1 + \tan^2 \theta = \sec^2 \theta$, then $\begin{cases} \sec^2 \theta - \tan^2 \theta = 1 \\ \sec^2 \theta - 1 = \tan^2 \theta \end{cases}$

(3) $\cot^2 \theta + 1 = \csc^2 \theta$, then $\begin{cases} \csc^2 \theta - \cot^2 \theta = 1 \\ \csc^2 \theta - 1 = \cot^2 \theta \end{cases}$

Pythagorean identity

- $\sin^2 \theta + \cos^2 \theta = 1$

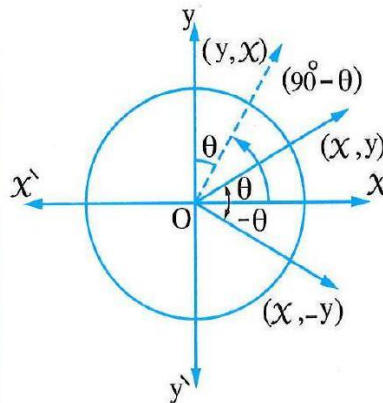
, then $\begin{cases} \sin^2 \theta = 1 - \cos^2 \theta \\ \cos^2 \theta = 1 - \sin^2 \theta \end{cases}$

- $1 + \tan^2 \theta = \sec^2 \theta$

, then $\begin{cases} \sec^2 \theta - \tan^2 \theta = 1 \\ \sec^2 \theta - 1 = \tan^2 \theta \end{cases}$

- $\cot^2 \theta + 1 = \csc^2 \theta$

, then $\begin{cases} \csc^2 \theta - \cot^2 \theta = 1 \\ \csc^2 \theta - 1 = \cot^2 \theta \end{cases}$

**The relation between $\tan \theta$, $\sin \theta$ and $\cos \theta$**

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

The relation between θ and $(90^\circ - \theta)$

- $\sin (90^\circ - \theta) = \cos \theta$

- $\cos (90^\circ - \theta) = \sin \theta$

- $\tan (90^\circ - \theta) = \cot \theta$

- $\csc (90^\circ - \theta) = \sec \theta$

- $\sec (90^\circ - \theta) = \csc \theta$

- $\cot (90^\circ - \theta) = \tan \theta$

Remark

The relations between the trigonometric

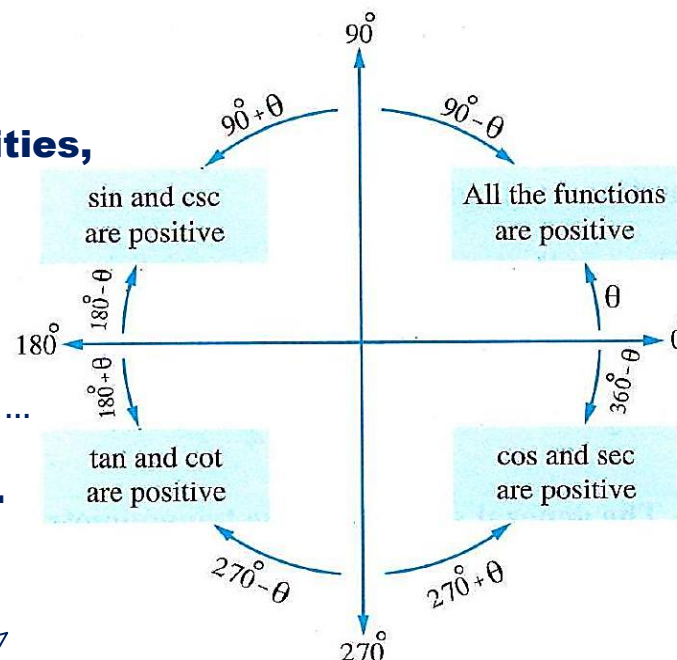
functions of the related angles are identities,

and we can remember them from

the opposite figure. For example :

$$\sin(90^\circ + \theta) = \cos \theta , \tan(360^\circ - \theta) = -\tan \theta , \dots$$

each of them is a trigonometric identity.



Remember The general solution of the trigonometric equation

If β is the smallest positive measure satisfying the equation, $n \in \mathbb{Z}$, then :

(1) The general solution of the equation: $\cos \theta = a$ is $\theta = \pm\beta + 2\pi n$

For example : If $\cos \theta = \frac{1}{2}$ (**Positive**)(θ lies in 1st or 4th quadrant)

$\therefore$ The smallest positive measure satisfying the equation is

$$\beta = 60^\circ = \frac{\pi}{3}^{\text{rad}} \text{ (1st quadrant) or } \beta = -60^\circ = -\frac{\pi}{3}^{\text{rad}} \text{ (4th quadrant)}$$

$\therefore$ The general solution is $\theta = \pm\frac{\pi}{3} + 2\pi n$

(2) The general solution of the equation : $\sin \theta = a$

is $\theta = \beta + 2\pi n$, or $\theta = (\pi - \beta) + 2\pi n$ **For example :**

If $\sin \theta = \frac{1}{2}$ (**positive**)(θ lies in 1st or 2nd quadrant)(shift $\sin(\frac{1}{2})$ then $= 30^\circ$

$\therefore$ The smallest positive measure satisfying the equation is $\beta = 30^\circ +$

$30^\circ = 60^\circ$ (first quadrant) or $\beta = 120^\circ$ (2nd quadrant) $\therefore$ The general solution

is $\theta = \frac{\pi}{6} + 2\pi n$, or $\theta = \frac{2\pi}{3} + 2\pi n$

(3)The general solution of the equation : $\tan \theta = a$ is $\theta = \beta + \pi n$ For

example : If $\tan \theta = -1$ (negative) $\therefore$ The smallest positive measure satisfying the equation is $\beta = 180^\circ - 45^\circ = 135^\circ$ (Second quadrant):. The general solution is $\theta = \frac{3\pi}{4} + \pi n$

The general solution of the trigonometric equations of the quadrantal

$\sin \theta = 0$	its general solution is : $\theta = \pi n$
$\sin \theta = 1$	its general solution is : $\theta = \frac{\pi}{2} + 2\pi n$
$\sin \theta = -1$	its general solution is : $\theta = \frac{3\pi}{2} + 2\pi n$
$\cos \theta = 0$	its general solution is : $\theta = \frac{\pi}{2} + \pi n$
$\cos \theta = 1$	its general solution is : $\theta = 2\pi n$
$\cos \theta = -1$	its general solution is : $\theta = \pi + 2\pi n$

Remarks

(1) $-1 \leq \cos \theta \leq 1$ and $-1 \leq \sin \theta \leq 1$ for all real values of θ So, we find that the two equations : $\sin \theta = a, \cos \theta = a$ don't have solution in $\mathbb{R}$, if $a \notin [-1, 1]$

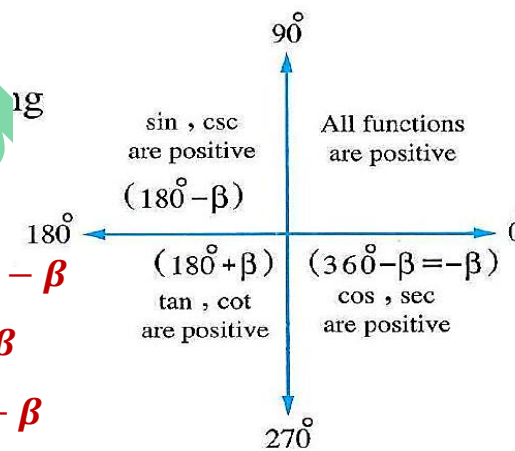
(2) To find the general solution of the trigonometric equation in the form : $\cos \theta = a, \sin \theta = a$ or $\tan \theta = a$, on an interval follow the following steps :

(a) Let β be the measure of the acute angle which satisfies the equation : $\cos \theta = |a|, \sin \theta = |a|$ or $\tan \theta = |a|$

(b) Determine the quadrant in which the angle lies according to the sign of a "Look to the opposite figure" :

(c) Find the values of the angle θ where :

- If θ lies in the first quadrant, then $\theta = \beta$
- If θ lies in the second quadrant, then $\theta = 180^\circ - \beta$
- If θ lies in the third quadrant, then $\theta = 180^\circ + \beta$
- If θ lies in the fourth quadrant, then $\theta = 360^\circ - \beta$



Remember Solving the right-angled triangle

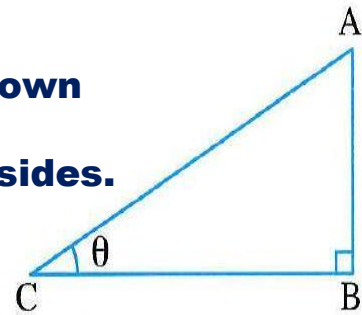
Solving the right-angled triangle is evaluating the unknown measures of its angles and the unknown lengths of its sides.

To solve the right-angled triangle, we use

Pythagoras' theorem : $(AC)^2 = (AB)^2 + (BC)^2$

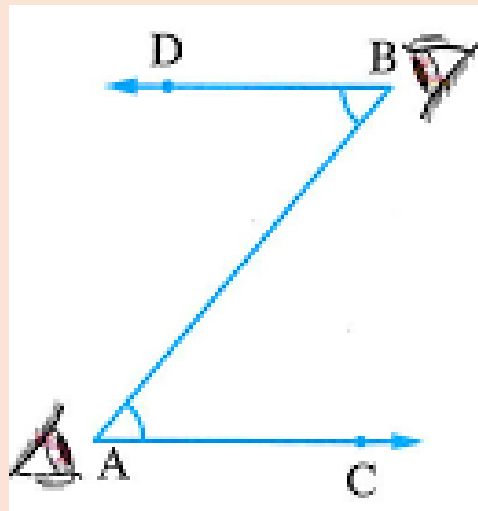
- Trigonometric ratios :

$$\sin \theta = \frac{\text{Opposite}}{\text{Hypotenuse}} = \frac{AB}{AC}, \quad \cos \theta = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \frac{BC}{AC}, \quad \tan \theta = \frac{\text{Opposite}}{\text{Adjacent}} = \frac{AB}{BC}$$



Remember Angles of elevation and angles of depression**Angle of elevation**

If a person looked from the point A to an object at the point B above his horizontal sight, then the included angle between the horizontal ray $\overrightarrow{AC}$ and the seeing ray to above $\overrightarrow{AB}$ is called the elevation angle of B with respect to A i.e. $\angle CAB$ is the elevation angle of B with respect to A

**Angle of depression**

If a person looked from the point B to an object at the point A down his horizontal sight, then the included angle between the horizontal ray $\overrightarrow{BD}$ and the seeing ray to down $\overrightarrow{BA}$ is called the depression angle of A with respect to B i.e. $\angle DBA$ is the depression angle of A with respect to B

Notice that

The measure of the elevation angle of B with respect to A = the measure of the depression angle of A with respect to B i.e. $m(\angle CAB) = m(\angle ABD)$

Remember Areas of some geometric figures**Triangle**

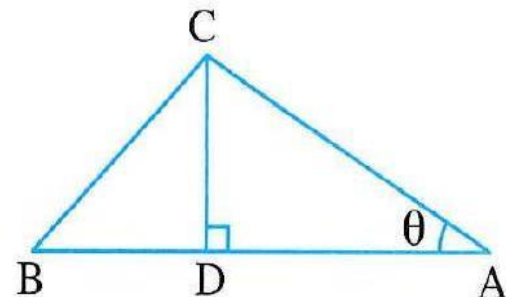
(1) The area of the triangle

$$= \frac{1}{2} \text{ length of the base} \times \text{height} = \frac{1}{2} AB \times CD$$

(2) The area of the triangle

$$= \frac{1}{2} \text{ the product of the lengths of two sides} \times \text{sine of the included angle between them} = \frac{1}{2} AB \times AC \times \sin \theta$$

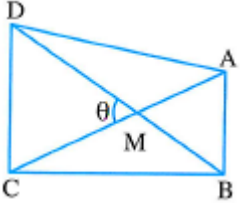
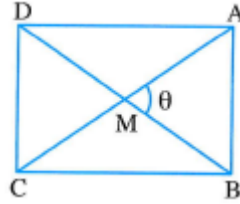
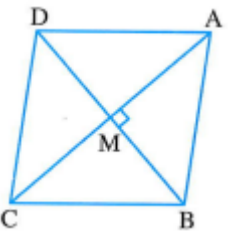
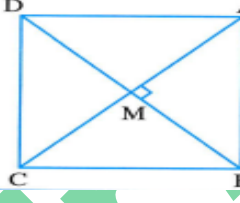
(3) The area of the triangle = $\sqrt{P(P - AB)(P - BC)(P - AC)}$ where P equals half of the perimeter of the triangle ABC

**Notice that :**

(1) The area of the equilateral triangle = $\frac{\sqrt{3}}{4} S^2$ where S is its side length.

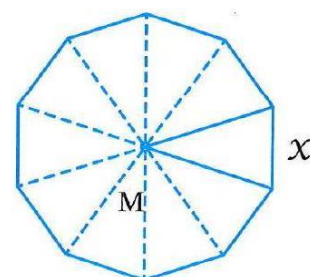
(2) The area of Regular Hexagon = $\frac{3\sqrt{3}}{2} S^2$ where S is its side length.

Some Quadrilateral Figures

Quadrilateral 	The area of the quadrilateral = $\frac{1}{2}$ product of the lengths of its diagonals $\times$ sine of the included angle between them $= \frac{1}{2} AC \times BD \times \sin \theta$
The rectangle 	The area of the rectangle = length $\times$ width = $BC \times AB$ The area of the rectangle = $\frac{1}{2}$ the square of its diagonal length $\times$ sine of the included angle between the two diagonals = $\frac{1}{2} (AC)^2 \times \sin \theta$
The Rhombus 	The area of the rhombus = $\frac{1}{2}$ the product of its diagonal lengths $= \frac{1}{2} AC \times BD$
The Square 	The area of the square = the square of its side length = $(AB)^2$ The area of the square = $\frac{1}{2}$ the square of its diagonal length = $\frac{1}{2} (AC)^2$

Regular polygon.

- It is a polygon in which all interior angles are equal in measure and all sides are equal in length.
- The area of the regular polygon in which the number of



its sides is n sides and the length of its side is x Then $A = \frac{1}{4}nx^2 \cot \frac{\pi}{n}$

Notice that

(1) The measure of vertex angle of a regular polygon in which the number of its sides is n sides $= \frac{(n-2) \times 180^\circ}{n}$

(2) We can divide the regular polygon in which the number of its sides is n sides into a number n of the congruent isosceles triangles and the measure of the vertex angle of each of them $= \frac{2\pi}{n}$

The Circle and its Parts(Circular Sector - Circular Segment).

(1) The area of a Circle $= \pi r^2$ and The Circumference of a Circle $= 2\pi r$

(2) The area of The Circular Sector $= \frac{1}{2}Lr = \frac{1}{2}r^2\theta^{rad}$

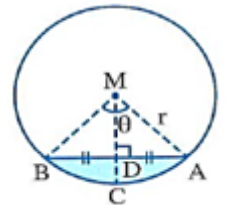
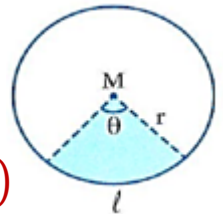
(3) The perimeter of The Circular Sector $= L + 2r = r(\theta^{rad} + 2)$

(4) The area of Circular Segment $= \frac{1}{2}r^2[\theta^{rad} - \sin \theta]$

(5) The perimeter of The Circular Segment $= L + 2r \sin \frac{\theta}{2} = \theta^{rad}r + 2r \sin \frac{\theta}{2}$

(6) the Length of the chord $AB = 2r \sin \frac{\theta}{2}$

(7) The area of $\triangle AMB = \frac{1}{2}r^2 \sin \theta$



Choose the correct answer from the given ones :

(1) A person observed a plane 1000 meter height, with an angle of elevation 40° , then the distance between the plane and the observer is to the nearest meter.

- (a) 643 (b) 1192 (c) 1305 (d) 1556

(2) Area of circular segment in which length of diameter of its circle 8 cm. and measure of its central angle $1.2^{\text{rad}} \approx \dots\dots\dots \text{cm}^2$

- (a) 8.57 (b) 2.14 (c) 4.28 (d) 1.07

(3) The perimeter of circular sector is $4r$ cm. where r is length of radius of its circle, then the radian measure of its central angle equals

- (a) $\frac{1}{2}$ (b) 8 (c) 2 (d) $\frac{1}{3}$

(4) The general solution of the equation : $\cos \theta = -1$ is where $n \in \mathbb{R}$

- (a) $\frac{\pi}{2} + \pi n$ (b) $\frac{\pi}{3} + \pi n$ (c) $\pi + 2\pi n$ (d) $\frac{\pi}{6} + 2\pi n$

(5) If $\tan \theta = 3$, then $\sec^2 \theta = \dots\dots\dots$

- (a) 9 (b) 10 (c) 8 (d) 7

(6) The length of side of equilateral triangle whose area $36\sqrt{3} \text{ cm}^2$. equals $\dots\dots\dots \text{cm}$.

- (a) $6\sqrt{3}$ (b) 24 (c) 6 (d) 12

(7) $\sin \theta \cos \theta \tan \theta$ in the simplest form equals

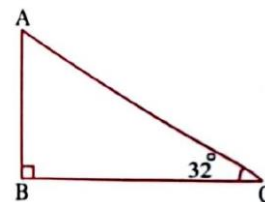
- (a) $\sin^2 \theta$ (b) $\cos^2 \theta$ (c) $\tan^2 \theta$ (d) $1 - \sin^2 \theta$

(8) In the opposite figure :

If $AB = 7 \text{ cm}$, $m(\angle C) = 32^\circ$,

then $AC \approx \dots\dots\dots \text{cm}$.

- (a) 13.2 (b) 8.3 (c) 3.7 (d) 5.9



(9) The area of the circular segment which the radius length 10 cm. and length of subtended arc 5 cm. $\simeq \text{cm}^2$

- (a) 0.13 (b) 0.51 (c) 2.05 (d) 1.03

(10) If $\cos \theta + 1 = 0$, where $0 \leq \theta < 360$, then $\theta =$

- (a) 90 (b) 180 (c) 270 (d) 360

(11) The area of the circular sector which the radius of its circle 4 cm. and the length of subtended arc 6 cm. $\approx$ cm²

- (a) 24 (b) 12 (c) 10 (d) 8

(12) The area of the quadrilateral whose diagonal lengths 6 cm., 8 cm. and measure of the included angle between them 30° equals cm²

- (a) 12 (b) 24 (c) $12\sqrt{3}$ (d) $24\sqrt{3}$

(13) $\sec x \cos x =$ such that (X) is an acute positive angle.

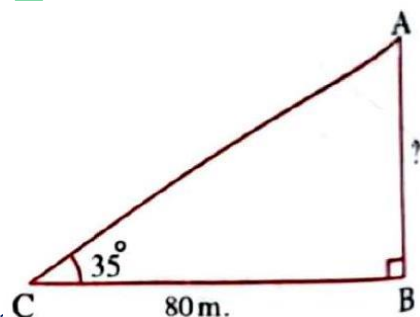
- (a) -1 (b) 1 (c) $\tan X$ (d) $\cotan X$

(14) From point on the ground at the distance 80 m.

from base of a tower a man found measure of

elevation angle of top of the tower was 35° ,

then the height of tower to nearest meter =



- (a) 55 (b) 56 (c) 57 (d) 58

(15) If $2\cos x - 1 = 0$, $0^\circ < x < 90^\circ$, then $x =$

- (a) 30 (b) 45 (c) 60 (d) 75

(16) If the perimeter of circular sector is 20 cm. and radius length of its circle equals 4 cm., then the area of circular sector is..... cm²

- (a) 24 (b) 48 (c) 40 (d) 80

(17) $5\cos^2 x + 5\sin^2 x =$

- (a) 5 (b) 1 (c) 10 (d) zero

(18) If $2\sin x - 1 = 0$ such that x is an acute angle then $m(\angle x) =$

- (a) 30 (b) 60 (c) 45 (d) 75

(19) If $\sin \theta - \cos \theta = 0.6$ where $0 < \theta < 90^\circ$, then $\sin \theta \cos \theta =$

- (a) 0.23 (b) 0.32 (c) 0.64 (d) 0.36

(20) If $a + b = 30^\circ$, then the numerical value of the expression : $\sin (3a + 2b) + \sin (9a + 8b) =$

- (a) -1 (b) zero (c) 1 (d) $\sqrt{3}$

(21) The area of a circular segment its chord is of length 18 cm. and the length of its radius is 18 cm. equals to the nearest cm^2

- (a) 28 (b) 29 (c) 30 (d) 60

(22) A regular hexagon its surface area is $54\sqrt{3} \text{ cm}^2$. Then its side length =

- (a) 3 (b) 4 (c) 5 (d) 6

(23) From the top of a rock 50 meters high above the sea level the angle of depression of a boat 100 meters apart from the base of the rock in radian =

- (a) 0.08 (b) 0.46 (c) 0.25 (d) 0.24

(24) The value of X which satisfy the equation : $5\sin X = 12\cos X$ where $x \in]0, \pi[$ to the nearest degree =

- (a) 157 (b) 112 (c) 67 (d) 22

(25) The simplest form of the expression : $(\sin \theta + \cos \theta)^2 - 2\sin \theta \cos \theta$ is

- (a) $2\sin \theta \cos \theta$ (b) 1 (c) 2 (d) $\sin^2 \theta - \cos^2 \theta$

(26) The general solution of the equation : $\cos \theta = \frac{1}{2}$ is

- (a) $\frac{\pi}{6} + \pi n$ (b) $\frac{\pi}{6} \pm 2\pi n$ (c) $\pm \frac{\pi}{3} + 2\pi n$ (d) $2\pi n \pm \frac{\pi}{4}$

(27) The perimeter of a circular sector whose area 18 cm^2 . and the length of its arc equals 6 cm. equals

- (a) 18 (b) 12 (c) 9 (d) 15

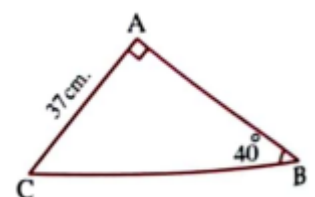
(28) The area of the triangle ABC in which $AB = 20 \text{ cm.}$, $AC = 12 \text{ cm.}$, and $m(\angle A) = 60^\circ$ equals

- (a) $30\sqrt{3}$ (b) 30 (c) 60 (d) $60\sqrt{3}$

(29) In the opposite figure :

$AB = \dots \dots \dots \text{cm.}$

- (a) $37\cot 40^\circ$ (b) $37\sin 40^\circ$



(c) $37 \csc 40^\circ$

(d) $37 \tan 40^\circ$

(30) An airplane 1000 metres high was observed by a person at an angle of elevation of measure 30° , then the distance between the plane and the observer equals metres.

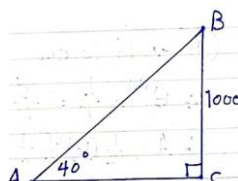
(a) 500

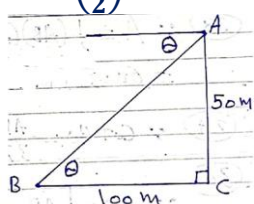
(b) 1000

(c) 1500

(d) 2000

Model Answer on Trigonometry :

(1) $\therefore \sin 40^\circ = \frac{1000}{AB}$ $AB = \frac{1000}{\sin 40^\circ} \approx 1556 \text{ m}$ 	(2) $\therefore r = 4 \text{ cm}, \theta^{\text{rad}} = 1.2$ $\therefore A = \frac{1}{2} r^2 [\theta^{\text{rad}} - \sin \theta] =$ $\frac{1}{2} (4)^2 [1.2 - \sin 1.2^{\text{rad}}] \approx$ $2.14 \text{ cm}^2. \text{ (b)}$	(3) $\therefore P = 1 + 2r =$ $r(\theta^{\text{rad}} + 2)$ $\therefore 4r = r(\theta^{\text{rad}} + 2) \Rightarrow$ $\theta^{\text{rad}} + 2 = 4 \therefore$ $m(\angle \theta^{\text{rad}}) = 2^{\text{rad}} \text{ (C)}$
(4) $\cos \theta = -1$ (c) $\pi + 2\pi n$	[5] $\sec^2 \theta = 1 + \tan^2 \theta$ $= 1 + 3^2 = 9 + 1$ $= 10 \text{ (b)}$	(6) $\therefore A = \frac{\sqrt{3}}{4} S^2 \therefore 36\sqrt{3} =$ $\frac{\sqrt{3}}{4} S^2 \therefore S^2 = 144 \therefore S =$ $\sqrt{144} = 12 \text{ cm} \cdot \text{ (d)}$
(7) $\therefore \sin \theta \cos \theta \frac{\sin \theta}{\cos \theta} =$ $\sin^2 \theta \text{ (a)}$	(8) $AC = \frac{7}{\sin 32^\circ} \approx 13.2 \text{ cm.}$ (a)	(9) $\therefore r = 10 \text{ cm} - L =$ $5 \text{ cm}, \therefore \theta^{\text{rad}} = \frac{L}{r} = \frac{5}{10} = \frac{1}{2}$ $\therefore A = \frac{1}{2} (10)^2 \left(\frac{1}{2} - \right.$ $\left. \sin^2 \frac{1}{2}^{\text{rad}} \right) \approx 1.03 \text{ cm}^2 \text{ (d)}$
(10) $\therefore \cos \theta = -1$ $\therefore m(\angle \theta) = 180^\circ$	(11) $\therefore L = 6 \text{ cm.}, r = 4 \text{ cm} \therefore$ $A = \frac{1}{2} Lr = \frac{1}{2} (6)(4) = 12 \text{ cm}^2$	(12) $\therefore A = \frac{1}{2} d_1 \times d_2 \times$ $\sin \theta = \frac{1}{2} (6)(8) \sin 30^\circ =$ $12 \text{ cm}^2 \text{ (a)}$

(13) $\therefore \sec x \cdot \cos x = 1$	(14) $\therefore \tan C = \frac{AB}{BC} \therefore AB =$ $80 \tan 35 \approx 56 \text{ m (b)}$	(15) $\therefore \cos \theta = \frac{1}{2} \therefore$ $m(\angle \theta) = 60^\circ \text{ where } 0 <$ $\theta < 90$
(16) $\therefore P = L + 2r \therefore 20 =$ $l + 8, \therefore L = 12 \text{ cm} \therefore \text{area} =$ $\frac{1}{2} L r = \frac{1}{2} \times 12 \times 4 = 24 \text{ cm}^2$	(17) $\therefore 5(\cos^2 \theta + \sin^2 \theta) = 5$	[18] $\therefore \sin x = \frac{1}{2} \therefore$ $m(\angle x) = 30^\circ \text{ where } x \text{ is}$ acute,
(19) $\therefore (\sin \theta - \cos \theta)^2 =$ $1 - 2 \sin \theta \cos \theta \therefore (0.6)^2 =$ $1 - 2 \sin \theta \cos \theta \therefore$ $\sin \theta \cos \theta = \frac{1-0.6^2}{2} = \frac{8}{25} =$ 0.32 (b)	(20) $\therefore a + b = 30^\circ \therefore$ $\sin(3a + 2b) + \sin(9a + 8b)$ $= \sin(2(a + b) + a) +$ $\sin(8(a + b) + a) =$ $\sin(60 + a) + \sin(240 +$ $a) = \sin(60 + a) +$ $\sin(180 + (60 + a)) =$ $\sin(60 + a) - \sin(60 + a) =$ 0 (b)	(21) $\therefore AB = 2r \sin \frac{\theta}{2} \therefore 18 =$ $2(18) \sin \frac{\theta}{2}, \therefore \sin \frac{\theta}{2} = \frac{1}{2}, \frac{\theta}{2} = 30$ $\therefore \theta = 60^\circ = \frac{\pi \text{ rad}}{3}, \therefore A =$ $\frac{1}{2} (18)^2 \left[\frac{\pi}{3} - \sin 60 \right] = 29.3 =$ 29 cm²
(22) $\therefore A = \frac{3\sqrt{3}}{2} S^2, \therefore 54\sqrt{3} = \frac{3\sqrt{3}}{2} S^2$ $\therefore S = 6 \text{ cm.}$	(23) $\therefore \tan \theta = \frac{1}{2} \Rightarrow$ shift mode $\rightarrow 4 \Rightarrow \text{shift} \rightarrow$ $\tan \left(\frac{1}{2} \right) = 0.46 \text{ (b)}$ 	(24) $\therefore 5 \sin x = 12 \cos x$ $\therefore \frac{\sin x}{\cos x} = \frac{12}{5} \therefore \tan x = \frac{12}{5} \Rightarrow$ $\therefore m(\angle x) = 67^\circ$
(25) $(\sin \theta + \cos \theta)^2 -$ $2 \sin \theta \cos \theta = \sin^2 \theta +$ $\cos^2 \theta + 2 \sin \theta \cos \theta -$ $2 \sin \theta \cos \theta = 1 \text{ (b)}$	(26) $\therefore \cos \theta = \frac{1}{2} \text{ (positive)}$ $(\therefore \theta \text{ lies } 1^{\text{st}} \text{ or } 4^{\text{th}})$ $\therefore \theta = 60^\circ \text{ or } \theta = -60^\circ$ $\theta = \frac{\pi}{3} \text{ or } \theta = -\frac{\pi}{3}$ $\therefore \text{the general sol is } \theta =$	(27) $\therefore A = \frac{1}{2} L r \therefore 18 =$ $\frac{1}{2} (6) r \therefore r = 6 \text{ cm.} \therefore P = L +$ $2r, \therefore P = 6 + 2(6) =$

	$\pm \frac{\pi}{3} + 2\pi n$ (c)	18 cm (a)
(28) $\therefore A = \frac{1}{2}(AB)(AC)\sin A$ $= \frac{1}{2}(20)(12)\sin 60 = 60\sqrt{3} \text{ cm}^2.$	(29) $\therefore \cot 40 = \frac{AB}{37} \therefore AB =$ $37\cot 40$ (a)	(30) $\therefore AC = \frac{1}{2}AB, \therefore$ $1000 = \frac{1}{2}AB. \therefore AB =$ 2000 m

Third Final Revision on Geometry:

Remember Vectors The directed line segment

It is a line segment which has a starting point, an ending point and a direction from the starting point to the ending point.

$\overrightarrow{AB} \neq \overrightarrow{BA}$ (because they are different in the direction) but $\overrightarrow{AB} = -\overrightarrow{BA}$

The norm of $\overrightarrow{AB}$ is denoted by $\|\overrightarrow{AB}\|$ = the length of $\overrightarrow{AB}$ $\|\overrightarrow{AB}\| = \|\overrightarrow{BA}\|$

$\overrightarrow{AB}$ is equivalent to $\overrightarrow{CD}$ ($\overrightarrow{AB} = \overrightarrow{CD}$)

If the following two conditions verified :

(1) $\|\overrightarrow{AB}\| = \|\overrightarrow{CD}\|$

(2) $\overrightarrow{AB}$ and $\overrightarrow{CD}$ have the same direction.

$\overrightarrow{AB} = -\overrightarrow{DC}$ If the following two conditions verified :

(1) $\|\overrightarrow{AB}\| = \|\overrightarrow{DC}\|$

(2) $\overrightarrow{AB}$ and $\overrightarrow{DC}$ are in opposite directions.

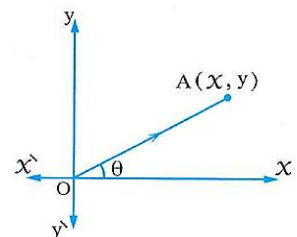
Notice that

$\overrightarrow{AB}$ and $\overrightarrow{CD}$ can not be in the same direction or in opposite directions unless one straight line carries them or two parallel straight lines.

Remember the position vector

The position vector of a given point A with respect to the origin point is the directed line segment $\overrightarrow{OA}$ and it is denoted by the symbol $\vec{A}$

- If $\overrightarrow{OA}$ is the position vector of the point $A(x, y)$, then :
- $\|\vec{A}\|$ = the length of $\overrightarrow{OA} = \sqrt{x^2 + y^2}$
- If $\|\vec{A}\| = 1$ (the unit), then $\vec{A}$ is called the unit vector.



$\vec{i} = (1, 0)$ and $\vec{j} = (0, 1)$ are the fundamental unit vectors in the two coordinates axes.

- $\vec{O} = (0, 0)$ is the zero vector and it has no direction and sometimes denoted by the symbol $\vec{O}$
- If $\vec{OA}$ is the position vector of the point $A(x, y)$ and θ is the measure of the positive angle which $\vec{OA}$ makes with the positive direction of X-axis, then there are three forms for $\vec{A}$:

1 Cartesian form $\vec{A} = (x, y)$	2 Polar form $\vec{A} = (\ \vec{A}\ , \theta)$	3 In terms of $\vec{i}$ and $\vec{j}$ $\vec{A} = x\vec{i} + y\vec{j}$
--	---	--

Notice that

- $x = \|\vec{A}\| \cos \theta$, then $\cos \theta = \frac{x}{\|\vec{A}\|}$ · $y = \|\vec{A}\| \sin \theta$, then $\sin \theta = \frac{y}{\|\vec{A}\|}$

Example 1

Write the vector $\vec{A} = (3, -\sqrt{3})$ in the polar form.

Solution

$$\therefore \|\vec{A}\| = \sqrt{9 + 3} = 2\sqrt{3} \quad \therefore \cos \theta = \frac{x}{\|\vec{A}\|} = \frac{3}{2\sqrt{3}} = \frac{\sqrt{3}}{2} > 0 \quad , \quad \sin \theta = \frac{y}{\|\vec{A}\|} = \frac{-\sqrt{3}}{2\sqrt{3}} = \frac{-1}{2} < 0$$

$$\therefore \theta = 360^\circ - 30^\circ = 330^\circ \quad \therefore \theta \text{ lies in the fourth quadrant.} \quad \therefore \vec{A} = (2\sqrt{3}, 330^\circ)$$

Example 2

Write in terms of the fundamental unit vectors $\vec{A} = (10, 135^\circ)$

Solution

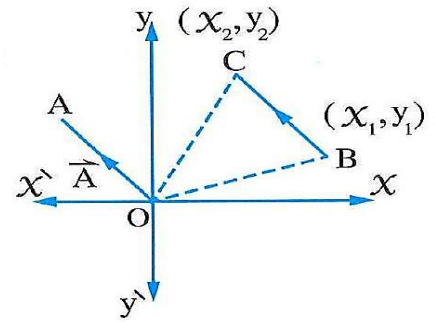
$$\therefore x = \|\vec{A}\| \cos \theta = 10 \cos 135^\circ = -5\sqrt{2}, \quad y = \|\vec{A}\| \sin \theta = 10 \sin 135^\circ = 5\sqrt{2}$$

$$\therefore \vec{A} = (-5\sqrt{2}, 5\sqrt{2}) \quad \therefore \vec{A} = -5\sqrt{2}\vec{i} + 5\sqrt{2}\vec{j}$$

- If $B(x_1, y_1)$ and $C(x_2, y_2)$, then the position
- vector $\overrightarrow{OA}$ which is equivalent to the vector
- $\overrightarrow{BC}$ is gotten from the relation :

$$\overrightarrow{OA} = \overrightarrow{BC} = \overrightarrow{OC} - \overrightarrow{OB}$$

i.e. $\vec{A} = (x_2, y_2) - (x_1, y_1) = (x_2 - x_1, y_2 - y_1)$



For example :

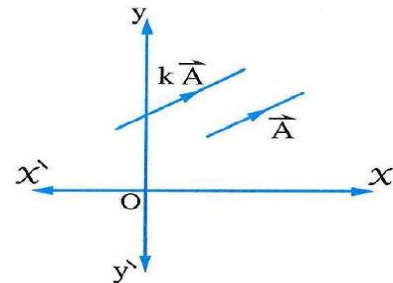
If $B = (3, 1)$ and $C = (2, 5)$, then : $\overrightarrow{BC} = \vec{C} - \vec{B} = (2, 5) - (3, 1) = (-1, 4)$

i.e. The equivalent position vector to $\overrightarrow{BC} = (-1, 4)$

Remember Operations on vectors

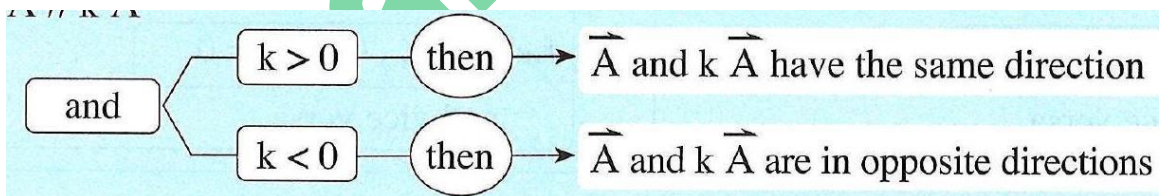
Multiplying a vector by a real number

If $\vec{A} = (x, y) \in \mathbb{R}^2, k \in \mathbb{R}$, then : $k\vec{A} = k(x, y) = (kx, ky)$



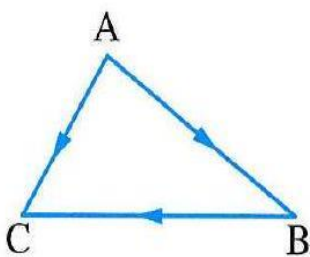
Notice that

(1) If $\vec{A} // k\vec{A}$

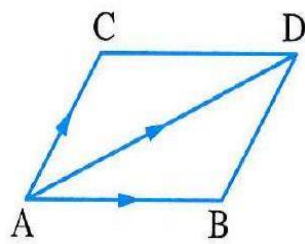


(2) $\|k\vec{A}\| = |k| \|\vec{A}\|$

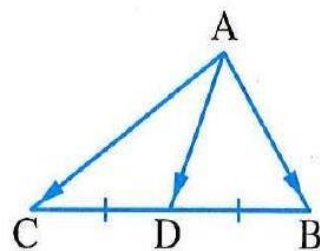
Adding and subtracting vectors Geometrically



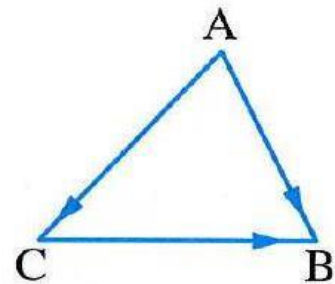
$$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$$



$$\overrightarrow{AB} + \overrightarrow{AC} = \overrightarrow{AD}$$



$$\overrightarrow{AB} + \overrightarrow{AC} = 2\overrightarrow{AD}$$



$$\overrightarrow{AB} - \overrightarrow{AC} = \overrightarrow{CB}$$

Algebraically

For any two vectors $\vec{A} = (x_1, y_1)$ and $\vec{B} = (x_2, y_2)$ $\vec{A} + \vec{B} = (x_1 + x_2, y_1 + y_2)$

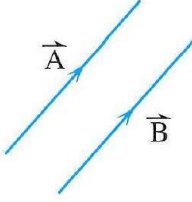
Notice that

- $\vec{A} + \vec{B} = \vec{B} + \vec{A}$ $\vec{A} + (-\vec{A}) = \vec{0}$ $\vec{A} + \vec{0} = \vec{A}$
- $(\vec{A} + \vec{B}) + \vec{C} = \vec{A} + (\vec{B} + \vec{C}) = \vec{A} + \vec{B} + \vec{C}$
- If $\vec{A} + \vec{B} = \vec{A} + \vec{C}$, then $\vec{B} = \vec{C}$ $\vec{A} - \vec{B} = \vec{A} + (-\vec{B})$

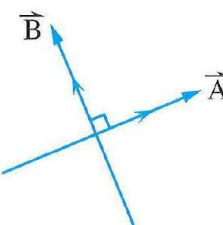
Parallel and perpendicular vectors

For any two non zero vectors $\vec{A} = (x_1, y_1)$ and $\vec{B} = (x_2, y_2)$

$\vec{A} \parallel \vec{B}$
if :
The slope of $\vec{A}$
= the slope of $\vec{B}$
i.e. $\frac{y_1}{x_1} = \frac{y_2}{x_2}$
i.e. $x_1 y_2 - x_2 y_1 = 0$
and vice versa.



$\vec{A} \perp \vec{B}$
if :
The slope of $\vec{A} \times$
the slope of $\vec{B} = -1$
i.e. $\frac{y_1}{x_1} \times \frac{y_2}{x_2} = -1$
i.e. $x_1 x_2 + y_1 y_2 = 0$
and vice versa.



Remember Applications on vectors

Geometric applications

(1) To prove that the points A, B and C are collinear using vectors, we prove that : $\vec{AB} = k\vec{AC}$ where k is constant.

(2) To prove that the quadrilateral $ABCD$ in which $\vec{AC} \cap \vec{BD} = \{M\}$ is a parallelogram using vectors, we prove that :

The two diagonals bisect each other

i.e. We prove that : $\vec{AM} = \vec{MC}, \vec{BM} = \vec{MD}$ or two opposite sides are parallel and equal in length i.e. We prove that : $\vec{AB} = \vec{DC}$ or $\vec{AD} = \vec{BC}$

(3) To prove that the quadrilateral is a rectangle, rhombus or square, then we should prove first that the quadrilateral is a parallelogram as previous, then :

• **To prove that the parallelogram is a rectangle, we prove one of the following properties :**

(1) Two adjacent sides are perpendicular. For example: $\overrightarrow{AB} \perp \overrightarrow{BC}$

(2) The two diagonals are equal in length. For example : $\|\overrightarrow{AC}\| = \|\overrightarrow{BD}\|$

• **To prove that the parallelogram is a rhombus, we prove one of the following properties :**

(1) Two adjacent sides are equal in length. For example : $\|\overrightarrow{AB}\| = \|\overrightarrow{BC}\|$

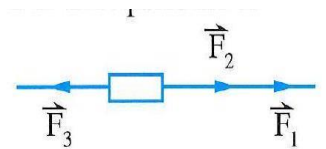
(2) The two diagonals are perpendicular. For example: $\overrightarrow{AC} \perp \overrightarrow{BD}$

• **To prove that the parallelogram is a square, we prove one of the properties of the rectangle and one of the properties of the rhombus together.**

Physical applications (1) The resultant force $\vec{F}$

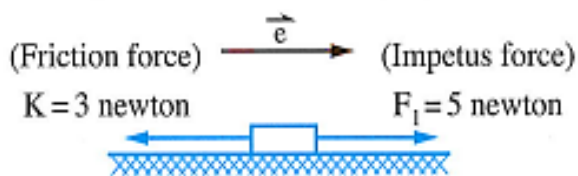
The resultant force of some forces acting on an object are subjected to the operation of adding vectors.

i.e. The resultant force $\vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \dots$



For example :

Body motion on a rough plane



The resultant force $\vec{F} = 5\vec{e} + (-3)\vec{e} = 2\vec{e}$
i.e.

- Magnitude of the resultant = 2 newtons.
- Direction of the resultant is in the direction of body motion.

The vertical motion

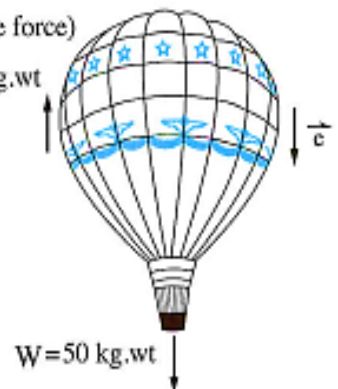
The resultant (Resistance force)

force $\vec{F} = 50\vec{e}$

$+ (-30\vec{e}) = 20\vec{e}$

i.e.

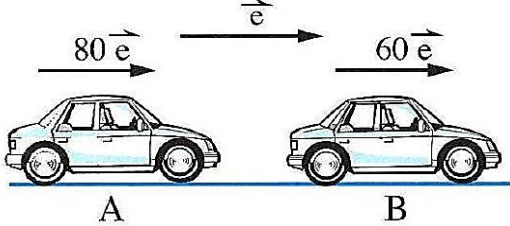
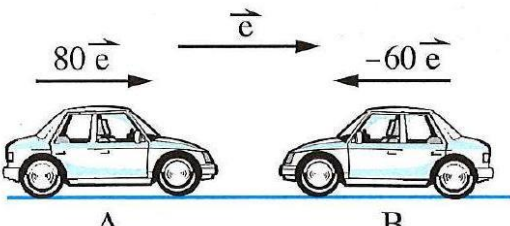
- Magnitude of the resultant = 20 kg.wt
- Direction of the resultant is in the direction of weight body.



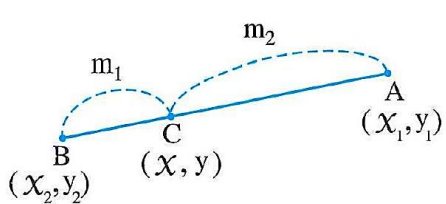
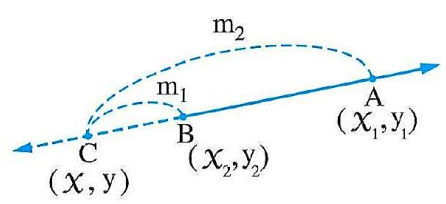
The relative velocity

If the actual velocity of the body $A = \vec{V}_A$ and the actual velocity of the body $B = \vec{V}_B$, then : The relative velocity of the body B with respect to the body $A = \vec{V}_{BA}$ and : $\vec{V}_{BA} = \vec{V}_B - \vec{V}_A$, $\vec{V}_{AB} = \vec{V}_A - \vec{V}_B$

For example : If we considered the unit vector $\vec{e}$ in the direction of the motion of the car A , the velocity of the car $A = 80 \text{ km/h}$ and the velocity of the car $B = 60 \text{ km/h}$.

	
If the two cars A and B move in the same direction , then $\vec{V}_{BA} = 60\vec{e} - 80\vec{e} = -20\vec{e}$ The driver of the car A feels that the car B retreats with velocity $20 \text{ km.}\frac{1}{h}$.	If the two cars A and B move in opposite directions, then $\vec{V}_{BA} = -60\vec{e} - 80\vec{e} = -140\vec{e}$ The driver of the car A feels that the car B moves in the opposite of its direction with velocity $140 \text{ km.}\frac{1}{h}$.

Remember Division of a line segment

Internally division  If $C \in \overline{AB}$, then C divides $\overline{AB}$ internally.	Externally division  If $C \in \overleftrightarrow{AB}$, $C \notin \overline{AB}$, then C divides $\overline{AB}$ externally.
--	--

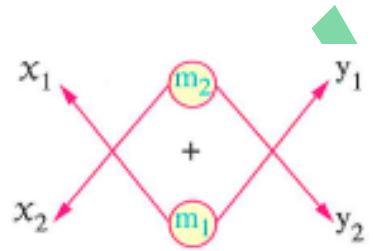
And we can find the coordinates of the division point **internally** or **externally** by using:

The vector form : $\vec{r} = \frac{m_1\vec{r}_1 + m_2\vec{r}_2}{m_1 + m_2}$

where $\vec{r}, \vec{r}_1$ and $\vec{r}_2$ are the position vectors $\vec{OC}, \vec{OA}$ and $\vec{OB}$

for the points C, A and B respectively.

The cartesian form : $(x, y) = \left(\frac{m_1x_1 + m_2x_2}{m_1 + m_2}, \frac{m_1y_1 + m_2y_2}{m_1 + m_2} \right)$



Remarks

(1) In the case of internally division, the two values m_1 and m_2 are positive. i.e. $\frac{m_2}{m_1} > 0$

(2) In the case of externally division, one of the two values m_1 and m_2 is positive and the other is negative. i.e. $\frac{m_2}{m_1} < 0$

(3) If C is the midpoint of $\overline{AB}$, then $\vec{r} = \frac{\vec{r}_1 + \vec{r}_2}{2}$ (the vector form)

, $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ (the cartesian form)

Remember The slope of the straight line

(1) If the straight line L passes through the two points (x_1, y_1) and (x_2, y_2) , then its slope $(m) = \frac{y_2 - y_1}{x_2 - x_1}$

For example : The straight line which passes through the two points $(1, 3)$ and $(4, 2)$, its slope $(m) = \frac{2-3}{4-1} = \frac{-1}{3}$

(2) If θ is the measure of the positive angle which the straight line L makes with the positive direction of X -axis, then its slope $(m) = \tan \theta$

For example : If the straight line L makes a positive angle of measure 135° with the positive direction of x -axis, then its slope $(m) = \tan 135^\circ = -1$

(3) If $\vec{u} = (a, b)$ is a direction vector of the straight line L , then its slope $(m) = \frac{b}{a}$

For example : If $\vec{u} = (2, -3)$ is a direction vector of the straight line L , then its slope $(m) = \frac{-3}{2}$

(4) If the equation of the straight line L is in the form : $ax + by + c = 0$, then its slope $(m) = \frac{-a}{b}$ **For example :**

The straight line whose equation is $2x - 3y + 1 = 0$, its slope $(m) = \frac{-2}{-3} = \frac{2}{3}$

(5) If the equation of the straight line L is in the form : $y = bx + c$, then its slope $(m) = b$ **For example :**

The straight line whose equation is $y = \frac{-1}{2}x + 5$, its slope $(m) = \frac{-1}{2}$

Remarks

(1) The slope of X -axis and the slope of any horizontal straight line (**parallel to X -axis**) are equal to zero.

(2) The slope of **y -axis** and the slope of any vertical straight line (**parallel to y -axis**) are undefined.

(3) If L_1 and L_2 are two straight lines of slopes m_1 and m_2 respectively, then : $L_1 \parallel L_2 \Leftrightarrow m_1 = m_2$

i.e. The two parallel straight lines have equal slopes and vice versa.

$$L_1 \perp L_2 \Leftrightarrow m_1 \times m_2 = -1$$

(unless one of them is parallel to one of the two coordinate axes)

(4) If the slope of $\overrightarrow{AB}$ = the slope of $\overrightarrow{BC}$, then the points A, B and C are collinear.

Remember The direction vector of a straight line

(1) The straight line whose slope $m = \frac{a}{b}$, then its direction vector $\vec{u} = (b, a)$

For example : The straight line whose equation is $2x - 3y + 5 = 0$, its slope $(m) = \frac{-a}{b} = \frac{-2}{-3} = \frac{2}{3}$, then its direction vector $\vec{u} = (3, 2)$

(2) The straight line which passes through the two points $C(x_1, y_1)$ and $D(x_2, y_2)$, then its direction vector $\vec{u} = \overrightarrow{CD} = \vec{D} - \vec{C} = (x_2 - x_1, y_2 - y_1)$

Remarks

(1) If the direction vector of the straight line L is $\vec{u} = (a, b)$, then the direction vector of the perpendicular straight line to the straight line L is $\vec{N} = (-b, a)$ or $(b, -a)$

(2) The direction vector of any straight line parallel to X -axis $\vec{i} = (1, 0)$

(3) The direction vector of any straight line parallel to y -axis $\vec{j} = (0, 1)$

Remember The different forms of the equation of the straight line

(1) The different forms of the equation of the straight line which passes through the point $A(x_1, y_1)$ and its direction vector $\vec{u} = (a, b)$

The vector equation	The parametric equations	The cartesian equation
$\vec{r} = \vec{A} + k \vec{u}$ <i>i.e.</i> $(X, y) = (x_1, y_1) + k(a, b)$	$X = x_1 + k a$ $y = y_1 + k b$	$\frac{y - y_1}{x - x_1} = m$

(2) The different forms of the equation of the straight line which passes through the two points $P(x_1, y_1)$ and $N(x_2, y_2)$

i.e. its direction vector $\vec{u} = \vec{N} - \vec{P} = (x_2 - x_1, y_2 - y_1)$

The vector equation	The parametric equations	The cartesian equation
$\vec{r} = \vec{P} + k(\vec{N} - \vec{P})$ <i>i.e.</i> $(X, y) = (x_1, y_1) + k(x_2 - x_1, y_2 - y_1)$	$X = x_1 + k(x_2 - x_1)$ $y = y_1 + k(y_2 - y_1)$	$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$

(3) The cartesian equation of the straight line whose slope is m and intercepts from y -axis a part of length $|b|$ (i.e. intersects y -axis at the point $(0, b)$) is $y = mx + b$

(4) The cartesian equation of the straight line which intersects X -axis at $(a, 0)$ and y -axis at $(0, b)$ (i.e. intersects from the two axes two parts of lengths $|a|$ and $|b|$) is $\frac{x}{a} + \frac{y}{b} = 1$

(5) If the two straight lines $L_1: a_1x + b_1y + c_1 = 0$ and $L_2: a_2x + b_2y + c_2 = 0$ intersect at a point, then the general equation of any straight line passing through the point of intersection of L_1 and L_2 other than L_1 and L_2 is $a_1x + b_1y + c_1 + k(a_2x + b_2y + c_2) = 0$ Where $k \neq 0$

Remarks

(1) The equation of the straight line which passes through the origin point $O(0,0)$ is :

- The vector equation is : $\vec{r} = k\vec{u}$, where $\vec{u}$ is the direction vector of the straight line.
- The cartesian equation is : $y = mx$, where m is the slope of the straight line.

(2) The straight line which is parallel to X -axis and passes through the point (x_1, y_1)

- The vector equation is : $\vec{r} = (x_1, y_1) + k(1, 0)$
- The cartesian equation is : $y = y_1$

(3) The straight line which is parallel to y -axis and passes through the point (x_1, y_1)

- The vector equation is : $\vec{r} = (x_1, y_1) + k(0, 1)$
- The cartesian equation is : $x = x_1$

Remember The measure of the angle between two straight lines

If θ is the measure of the included angle between the two straight lines L_1 and L_2 whose slopes are m_1 and m_2 , then

$$\tan \theta = \left| \frac{m_1 - m_2}{1 + m_1 m_2} \right| \text{ where } \theta \in \left[0, \frac{\pi}{2} \right]$$

With noticing the following:

(1) If the tangent ($\tan \theta$) is **positive**, then we obtain an **acute** angle.

(2) If the tangent ($\tan \theta$) is **zero**, then the measure of the included angle = **zero**, then $m_1 = m_2$ and the two straight lines are **parallel** or **coincident**.

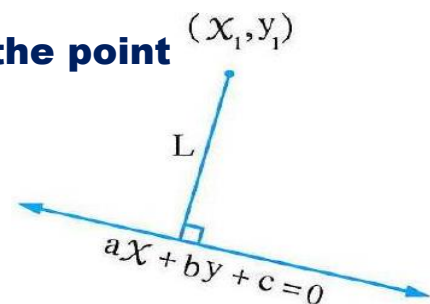
(3) If the tangent ($\tan \theta$) is **undefined**, then the measure of the included angle is 90° , then $m_1 m_2 = -1$ and the two straight lines are **orthogonal** (**perpendicular**).

(4) The measure of the **obtuse angle** = the measure of the supplementary angle of the acute angle.

Remember The length of the perpendicular from a point to a straight line

- The length of the perpendicular (**L**) drawn from the point (x_1, y_1) to the straight line whose equation is : $ax + by + c = 0$ is determined by the relation :

$$\text{The length of the perpendicular } (L) = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

**Remarks**

(1) If the length of the perpendicular drawn from the point (x_1, y_1) to the straight line $ax + by + c = 0$ equals zero, then the point lies on the straight line.

(2) The length of the perpendicular drawn from the origin point $(0, 0)$ to the straight line : $ax + by + c = 0$ equals $\frac{|c|}{\sqrt{a^2+b^2}}$

(3) The length of the perpendicular drawn from the point (x_1, y_1) to x -axis $= |y_1|$

(4) The length of the perpendicular drawn from the point (x_1, y_1) to y -axis $= |x_1|$

(5) If (x_1, y_1) and (x_2, y_2) are two points in the Cartesian plane which contains the straight line : $ax + by + c = 0$ and the two expression $ax_1 + by_1 + c$ and $ax_2 + by_2 + c$ have the same sign, then the two points (x_1, y_1) and (x_2, y_2) are on the same side of the straight line, and if they have different signs, then the two points are in two different sides of the straight line.

Choose the correct answer from the given ones :

(1) An object moves from a point 6 meter in direction of east then 8 meters in direction of south then (the covered distance - magnitude of displacement) =.....

- (a) 2 (b) 10 (c) 4 (d) 14

(2) If $\vec{A} = 3\vec{i} + k\vec{j}$ and $\|\vec{A}\| = 5$, then $k =$

- (a) 4 (b) -4 (c) ± 4 (d) 2

(3) If $\vec{A} = (2, -1)$, $\vec{B} = (3, 4)$, $\vec{C} = (k, 15)$ and two vectors $\vec{C}$, $\vec{B} - \vec{A}$ are parallel then $K =$

- (a) 1 (b) 2 (c) 3 (d) 4

(4) If $\vec{A} = 4\vec{i} - 3\vec{j}$, $\vec{B}$ such that $\vec{A} \perp \vec{B}$, $\|\vec{A}\| = \|\vec{B}\|$ then, $\vec{B}$ may equal

- (a) $(3, 4)$ (b) $(-3, 4)$ (c) $(4, 3)$ (d) $(-4, 3)$

(5) The polar form of the vector $\vec{A} = \sqrt{3}\vec{i} + \vec{j}$ is.....

- (a) $(2, \frac{\pi}{3})$ (b) $(4, \frac{\pi}{3})$ (c) $(2, \frac{\pi}{6})$ (d) $(4, \frac{\pi}{6})$

- (6) The ratio that X -axis divides line segment $\overline{AB}$ where $A = (2, 5), B = (7, -2)$ is.....
- (a) 5: 2 **internally.** (b) 2: 3 **internally.**
(c) 3: 2 **externally.** (d) 2: 5 **externally.**
- (7) The area of triangle bounded by x -axis, y -axis and straight line $2x + 3y = 6$ equals square units.
- (a) 6 (b) 3 (c) 2 (d) 12
- (8) Measure of acute angle between two straight lines $L_1: \vec{r} = (2, 5) + k(-3, 1), L_2: 2x = 3 - y$ equals
- (a) 30° (b) 45° (c) 60° (d) 50°
- (9) If slope of straight line $\overline{AB}$ equals $\frac{1}{2}, A = (-2, 5)$ which of the following points lies on straight line $\overline{AB}$?
- (a) (0, 6) (b) (1, 4) (c) (2, 6) (d) (6, 4)
- (10) If the point $(4, b)$ lies on straight line whose equation : $y = 6 - k, x = 3k - 2$ then $b = \dots\dots\dots$
- (a) 3 (b) 4 (c) 5 (d) 6
- (11) If measure of angle between two straight lines : $L_1: x + ky + 2 = 0$ (where $k > 0$), $L_2: x - 2y + 1 = 0$ equals 45° then $k =$
- (a) 3 (b) $\frac{1}{3}$ (c) 1 (d) $\frac{-1}{3}$
- (12) The distance between two straight lines : $2x + y = 6, \vec{r} = (0, 6) + k(-1, 2)$ equals length unit.
- (a) $\frac{1}{2}$ (b) 4 (c) $\frac{19}{3}$ (d) 0
- (13) The equation of straight line passing through point of intersection of two straight lines : $2x + 3y - 2 = 0, 3x - y - 14 = 0$ and makes with positive direction of x -axis angle of measure 135° is.....
- (a) $x + y = 0$ (b) $x + y = 2$ (c) $x - y = 2$ (d) $y - x = 2$

(14) Equation of a straight line which passes through the point $(-1, 3)$ and parallel to x -axis is.....

- (a) $x = -1$ (b) $y = 3$ (c) $x - 1 = 0$ (d) $y + 3 = 0$

(15) If $\vec{A} = (6, -8)$, then $\|\vec{A}\| = \dots\dots\dots$

- (a) 6 (b) 8 (c) 10 (d) 14

(16) If $\vec{A} = (3, -2)$, $\vec{C} = (-2, k)$ are parallel, then $k = \dots\dots\dots$

- (a) -2 (b) 3 (c) $\frac{4}{3}$ (d) $-\frac{4}{3}$

(17) If $A(2, 5)$, $B(6, 7)$, then the ratio of division of $\overline{AB}$ by the y -axis equals

- (a) 1:3 externally. (b) 3:1 internally.
(c) 1:2 externally. (d) 3:2 internally.

(18) If $\vec{A} = (-4, 2)$, $\vec{B} = (3, -5)$, then $\vec{A} + 2\vec{B} =$

- (a) $(2, 8)$ (b) $(8, 2)$ (c) $(2, -8)$ (d) $(-2, 8)$

(19) If $\vec{A} = (3, K)$, $\vec{B} = (2, -3)$ and $\vec{A} \perp \vec{B}$, then $k = \dots\dots\dots$

- (a) 3 (b) 2 (c) -2 (d) -3

(20) If $\vec{u} = (3, 4)$ is direction vector of a straight line, then its slope equals

- (a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $-\frac{4}{3}$ (d) $-\frac{3}{4}$

(21) The measure of the acute angle between the two lines:

$x - 3y + 5 = 0$, $x + 2y - 7 = 0$ equals.....

- (a) 60° (b) 30° (c) 45° (d) 75°

(22) The equation of the straight line which passes through $(2, -3)$ and parallel to x -axis is.....

- (a) $x = -3$ (b) $y = -3$ (c) $x = 2$ (d) $y = 3$

(23) The length of perpendicular drawn from the point $(3, 1)$ to the straight line $4x + 3y - 5 = 0$ equals..... unit length.

- (a) 2 (b) 3 (c) 4 (d) 5

(24) The straight line $2x + 3y = 12$ makes with coordinate axes a triangle of area..... square units.

- (a) 4 (b) 6 (c) 8 (d) 12

(25) If the straight line L passes through the point $(2, 3)$ and its direction vector is $(-1, 2)$, then the parametric equation of this line are.....

- (a) $x = 2 - k, y = -3 + 2k$ (b) $x = 2 - k, y = 3 - 2k$
 (c) $x = 2 + k, y = 3 + 2k$ (d) $x = 2 - k, y = 3 + 2k$

(26) The measure of the angle between two lines whose slopes $\frac{1}{2}, -2$ is equal to.....

- (a) 45° (b) 30° (c) 90° (d) 60°

(27) All of the following vectors are unit vectors except :.....

- (a) $(1, 0)$ (b) $(0, -1)$ (c) $(1, 1)$ (d) $(0.6, 0.8)$

(280) If $\vec{A} + \vec{B} = (9, 11), \vec{B} = (6, 7)$, then $\|\vec{A}\| = \dots\dots\dots$

- (a) 3 (b) 4 (c) 5 (d) 6

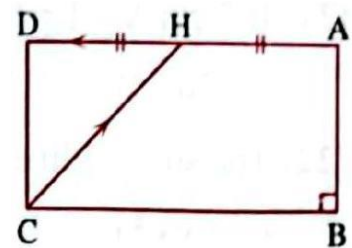
(29) The coordinates of point C which divides $\overline{AB}$ by ratio $2:1$ internally when $A = (2, -1), B = (5, -4)$ is.....

- (a) $(-4, 3)$ (b) $(4, 3)$ (c) $(4, -3)$ (d) $(-4, -3)$

(30) In the opposite figure :

$ABCD$ is a rectangle, H is the midpoint of $\overline{AD}$,

then $\vec{CH} + \vec{HD} = \dots\dots\dots$



- (a) $\vec{AC}$ (b) $\vec{CA}$ (c) $\vec{DC}$ (d) $\vec{CD}$

(31) If C is the midpoint of $\overline{AB}$ where $A(1, 2)$ and $B(3, 8)$ then point C is.....

- (a) $(2, 5)$ (b) $(3, 4)$ (c) $(4, 5)$ (d) $(4, 7)$

(32) If $\vec{A} = (6, 8)$, then $\|\vec{A}\| = \dots\dots\dots$ length unit.

- (a) 2 (b) 14 (c) 5 (d) 10

(33) If $\vec{A} = (2, 3), \vec{B} = (4, m), \vec{A} // \vec{B}$, then $m = \dots\dots\dots$

- (a) 2 (b) 3 (c) 4 (d) 6

(34) The straight line : $y = 3x + 5$ cuts y -axis at the point.....

- (a) (3, 5) (b) (0, 5) (c) (1, 3) (d) (0, 0)

(35) The slope of straight line : $2x - y = 1$ is..... cm.

- (a) 2 (b) 1 (c) -1 (d) 0.5

(36) The measure of the angle between two lines $X = 2$ and $y = 3$ is..... °

- (a) 30 (b) 45 (c) 60 (d) 90

(37) The length of the perpendicular which drawn from the point (3, 5) on x -axis is..... units.

- (a) 3 (b) 4 (c) 5 (d) 8

(38) If $\vec{A} = (1, 2), \vec{B} = (4, 6)$, then $\|\vec{AB}\| = \dots\dots\dots$ units.

- (a) 3 (b) 5 (c) 10 (d) 12

(39) ABCD is a parallelogram in which $A(2, -3), B(5, 1)$ and $C(6, 7)$, then the point $D = \dots\dots\dots$

- (a) (3, 1) (b) (1, 3) (c) (-1, 3) (d) (3, 3)

(40) If $\vec{c} = (5, 1), \vec{d} = (-2, 4)$, then $\|\vec{c} + \frac{1}{2}\vec{d}\| = \dots\dots\dots$

- (a) 1 (b) 5 (c) 7 (d) 25

(41) If $\vec{A} = -8\sqrt{3}\vec{i} - 8\vec{j}$, then $\vec{A}$ in its polar form is.....

- (a) (16, 30°) (b) (16, 150°) (c) (16, 240°) (d) (16, 210°)

(42) If $\vec{A} = (20, -15), \vec{B} = (7, 24)$ and if $\vec{M} = \vec{A} + \vec{B}, \vec{N} = \vec{A} - \vec{B}$, then.....

- (a) $\vec{M} // \vec{N}$ (b) $\vec{M} \perp \vec{N}$ (c) $\vec{M} = \vec{N}$ (d) $\|\vec{M}\| = \|\vec{N}\|$

(43) The ratio by which the x -axis divides $\overline{AB}$ where $A = (2, 4)$ and $B = (7, -3)$ is.....

- (a) 4: 3 internally. (b) 2: 7 internally.
(c) 3: 4 externally. (d) 4: 3 externally.

(44) The straight line whose equation is : $\vec{r} = (-1, 3) + k(2, 4)$ passes through the point.....

- (a) (2, 4) (b) (1, 5) (c) (-3, -1) (d) (0, 2)

(43) The distance between the two straight lines : $2x - y = 6$ and $\vec{r} = (0, -6) + k(-1, -2)$ equals..... length unit.

- (a) 0.5 (b) 4 (c) 6.3 (d) zero

(44) The equation of the straight line passing through the point $(-3, 1)$ and parallel to the x -axis is.....

- (a) $x + 3 = 0$ (b) $y + 3 = 0$ (c) $x - 1 = 0$ (d) $y - 1 = 0$

(45) The measure of the angle between the two straight lines

$L_1: 2x + y + 5 = 0$ and $L_2: \vec{r} = (1, 4) + k(3, -6)$ equals

- (a) 90 (b) 45 (c) 60 (d) zero

(46) If the measure of the angle between the two straight lines $y = ax + 3$, $x = -1$ equals 90° , then $a =$

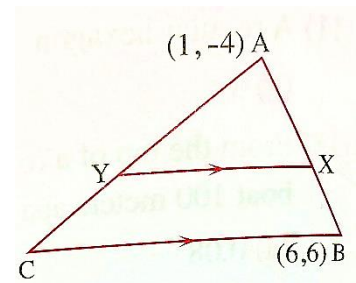
- (a) -1 (b) zero (c) 1 (d) 45

(47) In the opposite figure :

If $\overline{XY} \parallel \overline{BC}$, $AY:AC = 3:5$, then the coordinates

of point $X =$

- (a) (2, 4) (b) (4, 2)
(c) (-2, 4) (d) (-4, 2)



(48) If the straight line : $ax + by = 12$ cuts a part from the X -axis of length 3 units and a part from the y -axis of length 2 units, then $a + 2b =$

- (a) 16 (b) 8 (c) -8 (d) 2

(49) If the area of the triangle determined by the straight lines whose equations are : $x = 0$, $y = 0$, $\frac{x}{2} + \frac{y}{k} = 1$ equals 5 square units, then $k =$

- (a) 2 (b) 5 (c) 7 (d) 10

(50) ABC is a triangle in which D is the mid-point of $\overline{BC}$, then $\overrightarrow{AB} + \overrightarrow{AC} = \dots\dots\dots$

- (a) $\overrightarrow{BC}$ (b) $\overrightarrow{AD}$ (c) $\vec{O}$ (d) $2\overrightarrow{AD}$

(51) If $\vec{A} = (k, 2)$, $\vec{B} = (-6, 3)$ and $\vec{A} \parallel \vec{B}$, then $k = \dots\dots\dots$

- (a) 1 (b) -1 (c) 4 (d) -4

(52) If $\|4k\vec{A}\| = \|-12\vec{A}\|$, then $k = \dots\dots\dots$

- (a) 3 (b) -3 (c) ± 3 (d) ± 4

(53) If $\vec{A} = 5\vec{i} - \vec{j}$, $\vec{B} = (1, 4)$, then $\|\overrightarrow{AB}\| = \dots\dots\dots$

- (a) $\sqrt{41}$ (b) $\sqrt{39}$ (c) $(5, 4)$ (d) $5\vec{i} - \vec{j}$

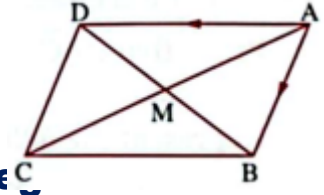
(54) If $\vec{A} = \left(10, \frac{\pi}{4}\right)$, then the polar form of $\frac{1}{2}\vec{A}$ is $\dots\dots\dots$

- (a) $\left(5, \frac{\pi}{2}\right)$ (b) $\left(10, \frac{\pi}{8}\right)$ (c) $\left(10, \frac{\pi}{2}\right)$ (d) $\left(5, \frac{\pi}{4}\right)$

(55) In the opposite figure :

$ABCD$ is a parallelogram in which $\overrightarrow{AB} + \overrightarrow{AD} = \dots\dots\dots$

- (a) $\overrightarrow{AM}$ (b) $2\overrightarrow{MC}$ (c) $\overrightarrow{CA}$ (d) $\overrightarrow{BC}$



(56) The ratio of division that the X -axis divides the line segment $\overline{AB}$ where $A(3, 2)$, $B(5, 6)$ equals $\dots\dots\dots$

- (a) 2:5 internally. (b) 5:2 externally.
(c) 1:3 internally. (d) 3:1 externally.

(57) The ratio of division that the X -axis divides the line segment $\overline{BA}$ where $A(3, 2)$, $B(5, 6)$ equals

- (a) 2:5 internally. (b) 5:2 externally.
(c) 1:3 internally. (d) 3:1 externally.

(58) The vector form of the equation of the straight line which passes through the origin point and the point $(1, 2)$ is $\dots\dots\dots$

- (a) $\vec{r} = k(1, 2)$ (b) $\vec{r} = (1, 2) + k(1, 0)$ (c) $\vec{r} = k(2, 1)$ (d) $\vec{r} = (1, 2) + k(0, 1)$

(59) If $A = (1, -4)$, $B = (6, 6)$, then the coordinates of the point C which divides $\overrightarrow{AB}$ internally by the ratio 3:2 is $\dots\dots\dots$

- (a) $(4, 2)$ (b) $(-4, 2)$ (c) $(-4, -2)$ (d) $(7, 2)$

(60) The measure of the acute angle between the two straight lines :

$L_1: \vec{r} = (2, 3) + k(4, 3)$, $L_2: x + 7y - 8 = 0$, is $\dots\dots\dots$

- (a) 30° (b) 60° (c) 45° (d) 90°

(61) The equation of the straight line which passes through the point $(4, 1)$

and is parallel to the straight line $3x + y + 4 = 0$, is.....

(a) $3x + y - 13 = 0$

(b) $x + y - 5 = 0$

(c) $2x + y - 9 = 0$

(d) $x + 3y - 7 = 0$

(62) If the measure of the included angle between the two straight lines $x = 3, y = ax + 7$ equals 90° , then $a = \dots\dots\dots$

(a) 3

(b) 0

(c) 1

(d) -1

(63) The length of the perpendicular drawn from the point $(3, 1)$ to the straight line $4x + 3y - 5 = 0$, equals . length units.

(a) 5

(b) 4

(c) 3

(d) 2

(64) The equation of the line which lies at equidistant from the two straight lines $y = -2$ and $y = 10$ is

(a) $y = 8$

(b) $y = 4$

(c) $x = 4$

(d) $x = -12$

Second Essay Questions

Answer the following questions :

(1) $ABCD$ is a quadrilateral in which : $\overrightarrow{BC} = 3\overrightarrow{AD}$ Prove that : $\overrightarrow{AC} + \overrightarrow{BD} = 4\overrightarrow{AD}$

(2) If $A = (3, -1), B = (5, 2)$ and $\vec{M} = (4, K)$, where $\overrightarrow{BA} \parallel \vec{M}$ (parallel) find value of K

(3) $ABCD$ is parallelogram in which $A(2, -2), B(4, -2), C(2, 3)$ Find the coordinate of D .

(4) $\triangle ABC$ in which $D \in \overline{BC}, 2DB = 3DC$, then Prove that : $2\overrightarrow{AB} + 3\overrightarrow{AC} = 5\overrightarrow{AD}$

(5) If $\vec{A} = (2, -3), \vec{B} = (3, 5)$, then express $\vec{C} = (12, 1)$ in terms of $\vec{A}, \vec{B}$

Model Answer on Geometry:

(1) ∴ The covered distance = $6 + 8.$ $= 14 \text{ m.} ∴ \text{magnitude of displacement}$ $= \sqrt{6^2 + 8^2} = 10 \text{ m}$ $∴ d - s = 14 - 10 = 4 \text{ m} \odot$	(2): $\ \hat{A} \ = \sqrt{3^2 + k^2} = 5$ $∴ 9 + k^2 = 25$ $∴ k^2 = 16 \Rightarrow ∴ k = \pm 4 \odot$	(3) $∴ \vec{B} - \vec{A} = (3 - 2, 4 - -1) =$ $∴ \frac{5}{1} = \frac{15}{K} \Rightarrow ∴ k = 3 \text{ (c)}$
(4) ∴ $\vec{A} \perp \vec{B} \therefore m_1 \times m_2 = -1 \therefore m$ $∴ m_2 = \frac{4}{3} \Rightarrow \text{(a) } (3, 4)$	(5) $∴ r = \sqrt{(\sqrt{3})^2 + 1^2} = 2, \theta = \tan^{-1}$ $∴ \theta = 30^\circ = \frac{\pi}{6} \text{ (c) } (2, \frac{\pi}{6})$	(6) A: 2 m_2 5 B: 7 m_1 -2 $∴ x\text{-axis divides line segment } \overline{AB} \therefore y = 0$ $∴ 5m_1 - 2m_2 = 0 \therefore \frac{m_2}{m_1} =$ $\frac{5}{2} \therefore 5:2 \text{ internally (b)}$
(7)) ∴ $2x + 3y = 6 \therefore \text{at } x = 0 \Rightarrow$ $y = 2 \text{ at } y = 0 \Rightarrow x = 3$ $∴ a(\Delta) = \frac{1}{2}(2)(3) = 3 \text{ square units.}$	(8):- $m_1 = \frac{-1}{3}$ and $m_2 = \frac{2}{-1} = -2$ $∴ \tan \theta = \left \frac{m_1 - m_2}{1 + m_1 \times m_2} \right = \left \frac{\frac{-1}{3} + 2}{1 + \frac{-1}{3} \times -2} \right = 1$ $∴ m(\angle \theta) = 45^\circ \text{ (b)}$	(9) ∴ $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1}{2}, \therefore A =$ $(-2, 5)$ and (a) $(0, 6) \therefore m = \frac{6 - 5}{6 - -2} =$ $\frac{1}{2} \therefore (0, 6) \text{ lies on } \overline{AB} \text{ a}$
(10) ∴ $m = \frac{-1}{3} = \frac{b - 6}{4 - -2} = \frac{b - 6}{6} \therefore b = 4$ (b) 4	(11) ∴ $m_1 = \frac{-1}{k}$ and $m_2 = \frac{-1}{-2} = \frac{1}{2}$ $∴ 1 = \left \frac{\frac{1}{2} + \frac{1}{k}}{1 + \frac{-1}{2 - k}} \right \therefore \text{by calc Then}$ k=3 (a)	(12) ∴ $L_1: 2x + y - 6 =$ 0 and $L_2: \vec{r} = (0, 6) +$ $k(-1, 2) \therefore L =$ $\frac{ ax_1 + by_1 + c }{\sqrt{a^2 + b^2}} = \frac{ 2(0) + b - 6 }{\sqrt{2^2 + 1^2}} =$ 0 d
(13) $\begin{bmatrix} 2x + 3y = 2 \\ 3x - y = 14 \end{bmatrix} \rightarrow \text{mode} \rightarrow 5 \rightarrow 1$ $∴ (x, y) = (4, -2) \in L$ $∴ m = \tan 135 = -1 \therefore \text{The equation is}$ $y - y_1 = m(x - x_1) \therefore y + 2 = -x + 4$ $y - -2 = -1(x - 4) \therefore x + y = 2$	(14) ∴ $L \parallel x\text{-axis} \therefore m = 0$ ∴ The equation is $y = 3$ (b)	(15) $\ \vec{A} \ = \sqrt{6^2 + 8^2} =$ 10 (c)
(16) ∴ $A \parallel \vec{C} \therefore \frac{-2}{3} = \frac{k}{-2} \therefore k =$ $\frac{4}{3}$	(17) divides $\overline{AB}$ by $y\text{-axis} \therefore$ $x = 0$ A: 2 m_2 5 B: 6 m_1 7	(18) $\vec{A} + 2\vec{B} = (-4, 2) +$ $2(3, -5) = (2, -8) \text{ (C)}$

	$\therefore 2m_1 + 6m_2 = 0$ $\therefore 2m_1 = -6m_2 \therefore \frac{m_2}{m_1} = \frac{2}{-6} = \frac{-1}{3} \therefore$ The Ratio is 1:3 externally (a)	
(19) $\therefore \vec{A} \perp \vec{B} \therefore \frac{k}{3} = \frac{-2}{-3}$ $\therefore k = 2$	(20) slope = $\frac{4}{3}$ (b)	(21) $\therefore m_1 = \frac{1}{3}, m_2 = \frac{-1}{2}$ $\therefore \tan \theta = \left \frac{\frac{1}{3} - \frac{-1}{2}}{1 + \frac{1}{3} \cdot \frac{-1}{2}} \right = 1 \therefore$ $m(\angle \theta) = 45^\circ$
(22) $\therefore L \parallel x\text{-axis} \therefore m = 0$ $\therefore$ The equation is $y = -3$ (b)	(23) $L = \frac{ 4(3)+3(1)-5 }{\sqrt{4^2+3^2}} = 2$ (a)	(24) at $x = 0$. $y = 4$ at $y = 0$ $x = 6$ $\therefore$ area = $\frac{1}{2} \times 4 \times 6 = 12$ cm. (d)
(25) $\therefore A = (2, 3), \vec{u} = (-1, 2)$ $\therefore$ The equations are $x = 2 - x$ $y = 3 - 2k$	[26] $\therefore m_1 \times m_2 = \frac{1}{2}x - 2 = -1 \therefore \theta = 90^\circ$	(27) (c) $(1, 1) \sqrt{1^2 + 1^2} = \sqrt{2} \neq 1$
(28) $\therefore \vec{A} = (9, 11) - \vec{B} = (9, 11) - (6, 7)$ $\therefore \vec{A} = (3, 4) \therefore \ \vec{A}\ = \sqrt{3^2 + 4^2} = 5$ (C)	(29) A: 2 2 -1 B: 5 1 -4 $\therefore C = \left(\frac{2x1 + 5 \times 2}{2 + 1}, \frac{2x - 4 + x - 1 }{2 + 1} \right)$ $C = (4, -3)$ C	(30) $\vec{CH} + \vec{HO} = \vec{CD}$ (d)
31) $C = \left(\frac{1+3}{2}, \frac{2+8}{2} \right) = (2, 5)$	[32] $\ \vec{A}\ = \sqrt{6^2 + 8^2} = 10$	[33] $\therefore \vec{A} \parallel \vec{B} \therefore \frac{2}{4} = \frac{3}{m} \therefore$ $m = 6$
(34) $\therefore L$ Cuts y-axis at $x = 0$ $\therefore y = 5 \therefore b(0.5)$	(35) $m = \frac{-2}{-1} = 2$ a	[36] (d) 90°
[37] on x-axis $\therefore L = y = 5$	[38] $\therefore \vec{AB} = \vec{B} - \vec{A} \therefore \vec{AB} = (4, 6) - (1, 2) = (3, 4) \therefore \ \vec{AB}\ = \sqrt{3^2 + 4^2} = 5$ L.u (b)	(39) $\therefore \vec{BC} = \vec{AD} \therefore \vec{C} - \vec{B} = \vec{D} - \vec{A}$ $\vec{D} = \vec{C} - \vec{B} + \vec{A} = (6, 7) - (5, 1) + (2, -3) = (3, 3)$ d
40 $\therefore \vec{c} + \frac{1}{2}\vec{d} = (5, 1) + \frac{1}{2}(-2, 4)$ $= (5, 1) + (-1, 2) = (4, 3)$ $\therefore \left\ \vec{c} + \frac{1}{2}\vec{d} \right\ = \sqrt{4^2 + 3^2} = 5$ $L \cdot u \therefore$	(41) $\therefore r = \sqrt{(8\sqrt{3})^2 + (8)^2} = 16$ $\therefore \tan \theta = \frac{-8}{-8\sqrt{3}} \therefore \theta = 30^\circ$ but	

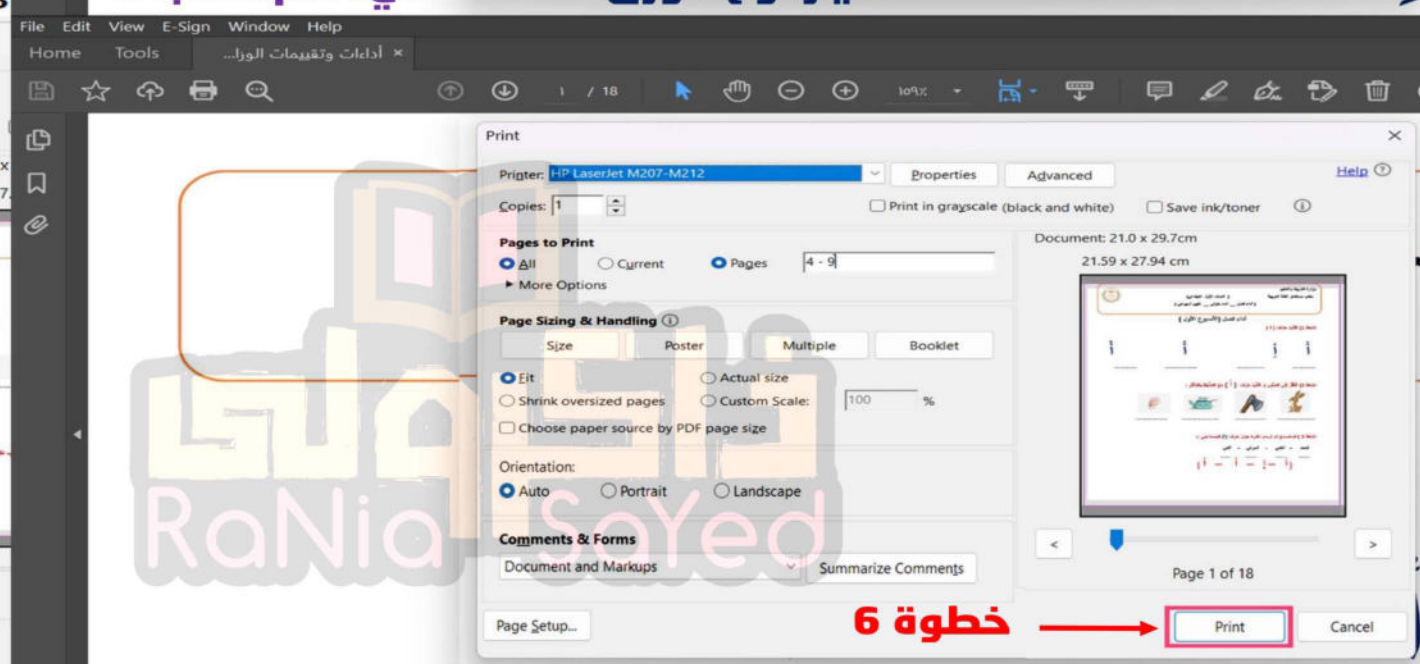
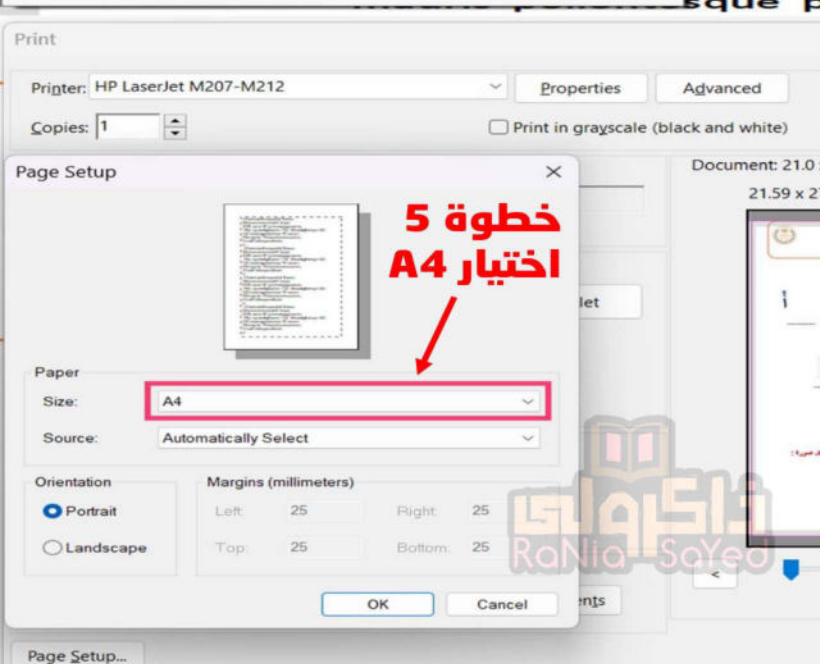
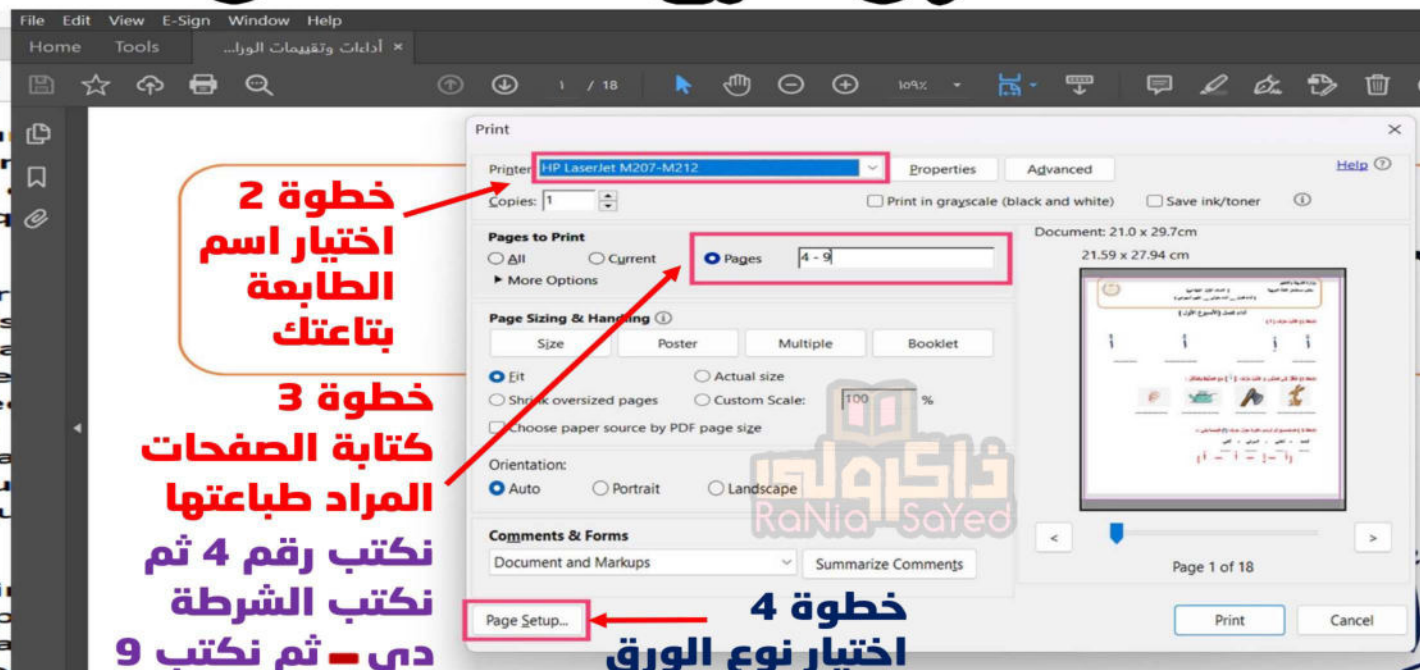
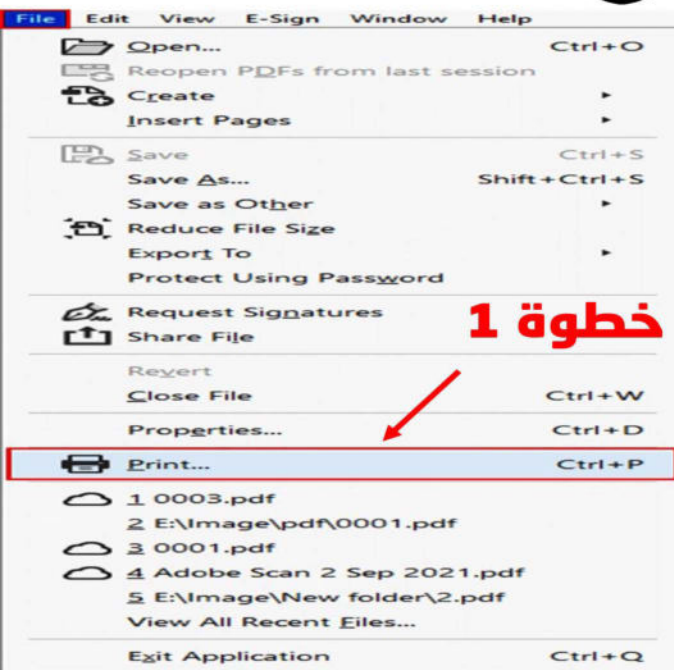
	θ lies in 3 rd quadrant $\therefore \theta = 180 + 30 = 210^\circ = \frac{7\pi}{6} \text{ rad}$ $\therefore$ its polar form = $(16, 210) \text{ d}$	
(42) $\vec{M} = (20, -15) + (7, 24) = (27, 9)$ $\therefore \vec{N} = (20, -15) - (7, 24) = (13, -39)$ $\vec{m} \perp \vec{N} \text{ b.c. because } \frac{9}{27} \times \frac{-39}{13} = -1$	(43) $\therefore$ divides x-axis $\therefore y = 0$ $\therefore 4m_1 - 3m_2 = 0 \therefore 4m_1 = 3m_2$ $\therefore \frac{m_2}{m_1} = \frac{4}{3} \text{ (a) } 4:3 \text{ internally}$	(44) $\therefore$ slope $= \frac{4}{2} = 2$ $\therefore$ at $c = (-3, -1)^2$ slope $= \frac{-1-3}{-3-1} = 2$ $\therefore$ (c) $(-3, -1)$ Lies on L
(45) $\therefore m_1 = \frac{-2}{1} = -2 \therefore \theta = 0 \text{ d)}$ $\therefore m_2 = \frac{-6}{3} = -2$ $\therefore \theta = 0 \text{ (d)}$	(46) $\therefore \theta = 90^\circ \therefore a = 0 \text{ (b)}$	(47) $C = \left(\frac{18+2}{3+2}, \frac{18-8}{3+2} \right) = (4, 2) \text{ b}$
(48) $\therefore (3, 0), (0, 2) \in L$ $\therefore a = 4, b = 6$ $\therefore a + 2b = 4 + 2(b) = 16 \text{ (a)}$	(49) $\therefore$ area $= \frac{1}{2}(2)(k) = 5$ $\therefore k = 5 \text{ (b)}$	(50) $\overrightarrow{AB} + \overrightarrow{AC} = 2\overrightarrow{AD}$ (d)
(51). $\vec{A} \parallel \vec{B} \therefore \frac{2}{k} = \frac{3}{-6}$ $\therefore k = -4 \text{ (d)}$	(52) $\therefore 4 k \parallel \vec{A} \parallel = 12 \parallel \vec{A} \parallel \therefore k =$ $\therefore k = \pm 3 \text{ (c)}$	(53) $\overrightarrow{AB} = (1, 4) - (5, -1) = (-4, 5)$ $\therefore \parallel \overrightarrow{AB} \parallel = \sqrt{4^2 + 5^2} = \sqrt{39} \text{ (b)}$
(54) $\frac{1}{2}\vec{A} = \left(\frac{1}{2}(10), \frac{\pi}{4} \right) =$ $\left(5, \frac{\pi}{4} \right) \text{ (d)}$	(55) $\therefore \overrightarrow{AB} + \overrightarrow{AD} = \overrightarrow{AC} = 2\overrightarrow{mC}$ (b)	(56) $\therefore y = 0$ $\therefore 6m_1 + 2m_2 = 0$ $\therefore 6m_1 = -2m_2 \therefore \frac{m_2}{m_1} = \frac{6}{-2}$ $= \frac{-3}{1}$ $\therefore 3:1 \text{ externally. d}$
(57) (d)	(58) (a) $\vec{r} = k(1, 2)$	(59) $C = \left(\frac{18+2}{5}, \frac{18-2}{5} \right) =$ $(4, 2) \text{ a}$
(60) $M_1 = \frac{3}{4}, M_2 = \frac{-1}{7}$ $\therefore \tan \theta = \left \frac{m_1 - m_2}{1 + m_1 m_2} \right =$ $\left \frac{\frac{3}{4} - \frac{-1}{7}}{1 + \frac{3}{4} \times \frac{-1}{7}} \right = 1 \therefore \theta = 45^\circ$	(61) $\therefore m_R = \frac{-3}{1} = -3$ $\therefore$ The equation is $y - y_1 =$ $m(x - x_1) \therefore y - 1 = -3(x - 4) \therefore$ $y = -3x + 13 \therefore 3x + y - 13 = 0$ a	62 $a = 0 \text{ (b)}$

$$(63) L = \frac{|4(3)+3(1)-5|}{\sqrt{4^2+3^2}} = 2$$

$$(64) \text{ The equation is } y = \frac{10+-2}{2} = 4 \quad y = 4 \quad (\mathbf{b})$$

Mr / Muhammed Hamdy

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجانا وحصريا

امتحانات رقم (1)

الترم الثاني



**1 Choose the correct answer from those given :**

(1) If $A = \begin{pmatrix} 1 & 3x - 2 \\ 10 & 5 \end{pmatrix}$ is symmetric matrix , then $x = \dots\dots\dots$

- (a) 1 (b) 2 (c) 3 (d) 4

(2) The point which belongs to the region of S.S. of the inequalities : $x + y \geq 5$, $x \geq 1$, $y \geq 2$ and make $R = 2x + y$ as great as possible is

- (a) (0 , 0) (b) (4 , 3) (c) (3 , 2) (d) (1 , 4)

(3) If $\tan \theta = 4$, then $\frac{\sin^2 \theta + \cos^2 \theta}{\sin^2 \theta - \cos^2 \theta} = \dots\dots\dots$

- (a) = 1 (b) - 1 (c) $\frac{17}{15}$ (d) $-\frac{17}{15}$

(4) If $\vec{A} = (1, -4)$, $\vec{B} = (1, -1)$, then $\|\vec{AB}\| = \dots\dots\dots$

- (a) 2 (b) 3 (c) 4 (d) 5

(5) The vector equation of the straight line which passes through the point (3 , 5) and passes through the origin point is

- (a) $\vec{r} = k(3, 5)$ (b) $\vec{r} = (3, 5) + k(0, 1)$
(c) $\vec{r} = (3, 5) + k(1, 0)$ (d) $\vec{r} = k(1, 0)$

(6) If A (3 , -1) , B (5 , 2) , then C which divides $\vec{AB}$ externally by the ratio 3 : 2 is

- (a) (-9 , 8) (b) (9 , 8) (c) (9 , -8) (d) (-9 , -8)

2 Choose the correct answer from those given :

(1) If $\begin{pmatrix} 4 & x \\ -1 & y \end{pmatrix} = \begin{pmatrix} 4 & -1 \\ 2 & 3 \end{pmatrix}^t$, then $2x - y = \dots\dots\dots$

- (a) - 1 (b) 5 (c) 1 (d) 2

(2) If $\begin{vmatrix} 1 & 0 & 0 \\ 3 & 3x & 5 \\ 6 & 1 & 2 \end{vmatrix} = 13$, then $x = \dots\dots\dots$

- (a) 3 (b) 2 (c) 4 (d) 5

(3) In circle M , $\overline{AB}$ is a diameter , C lies on the circle if $BC = 8$ cm. , $m(\angle BAC) = 40^\circ$, then the length of its radius is cm.

- (a) 7.8 (b) 6.2 (c) 9.5 (d) 4.8

(4) The area of a regular hexagon its side length 10 cm. is approximately cm^2

- (a) 260 (b) 180 (c) 254 (d) 312

(5) If $\vec{A} = (k, 2)$, $\vec{B} = 2\vec{i} + \vec{j}$ and $\vec{A} \perp \vec{B}$, then $k = \dots\dots\dots$

- (a) -1 (b) 1 (c) zero (d) 2

(6) The length of the perpendicular distance from (1, 1) to the straight line : $2x + 2y = 0$ is

- (a) zero (b) $\sqrt{2}$ (c) 1 (d) 2

3 Choose the correct answer from those given :

(1) The measure of the acute angle between $L_1 : x + 3y = 15$,

$\vec{r} = (-2, -1) + k(1, -3)$ approximately $^\circ$

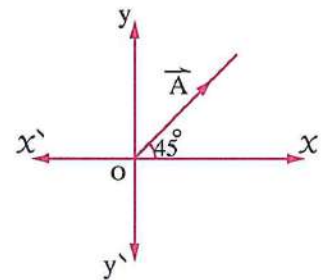
- (a) 53 (b) 50 (c) 42 (d) 43

(2) In the opposite figure :

If $\|\vec{A}\| = 4$ unit length

, then the cartesian form of $\vec{A} = \dots\dots\dots$

- (a) $(2\sqrt{2}, 2\sqrt{2})$ (b) (2, 2)
(c) $(\sqrt{2}, 2\sqrt{2})$ (d) $(\sqrt{2}, 2)$



(3) If A (3, -3), B (1, -1), C (-3, 3), then the point C divides $\overrightarrow{AB}$ by the ratio

- (a) $-\frac{3}{2}$ (b) $\frac{3}{2}$ (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$

(4) If $0^\circ < \theta < 360^\circ$ and $\sin \theta + 1 = 0$, then $\theta = \dots\dots\dots^\circ$

- (a) 0 (b) 90 (c) 180 (d) 270

(5) If $\begin{pmatrix} k \\ 4 \end{pmatrix} - \begin{pmatrix} 3 \\ m \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$, then $k + m = \dots\dots\dots$

- (a) -2 (b) 8 (c) 5 (d) 3

(6) The area of a circular sector if the measure of its angle is 2.2^{rad} and the radius of its circle is 6 cm. = cm^2

- (a) 27.5 (b) 28 (c) 39.6 (d) 45.8

4 Choose the correct answer from those given :

(1) If A is skew symmetric matrix, then $A + A^t = \dots\dots\dots$

- (a) 2A (b) $2A^t$ (c) O (d) zero

- (2) If A, B two matrices and $AB = \begin{pmatrix} -1 & 5 \\ 3 & 2 \end{pmatrix}$, then $B^t A^t = \dots\dots\dots$
- (a) $\begin{pmatrix} 2 & 3 \\ 5 & -1 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & 5 \\ 3 & -1 \end{pmatrix}$ (c) $\begin{pmatrix} -1 & 3 \\ 5 & 2 \end{pmatrix}$ (d) $\begin{pmatrix} -1 & -3 \\ -5 & 2 \end{pmatrix}$
- (3) If $A = \begin{pmatrix} 4 & 1 \\ 7 & 2 \end{pmatrix}$ and $A^{-1} = \begin{pmatrix} 2 & x \\ -7 & y \end{pmatrix}$, then $x - y = \dots\dots\dots$
- (a) -2 (b) -3 (c) -4 (d) -5
- (4) If the straight line passes through the two points (-3, 0) and (0, 2) parallel to the straight line $y = ax - 3$, then $a = \dots\dots\dots$
- (a) $-\frac{2}{3}$ (b) $\frac{2}{3}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$
- (5) A light house its height is 7.2 m its shadow is 3.8 m., then the measure of elevation angle of the sun is $\dots\dots\dots$
- (a) $32^\circ 38'$ (b) $84^\circ 35'$ (c) $62^\circ 11'$ (d) $56^\circ 18'$
- (6) If diagonals of a parallelogram ABCD intersect at M, then $\overrightarrow{CM} = \dots\dots\dots$
- (a) $\overrightarrow{DM}$ (b) $\overrightarrow{MB}$ (c) $\overrightarrow{BM}$ (d) $\overrightarrow{MA}$
- (7) If $\overrightarrow{AB} = \overrightarrow{CD}$ where $\overrightarrow{AB} = (6, 4)$, $\overrightarrow{C} = (1, 3)$, then $\overrightarrow{D} = \dots\dots\dots$
- (a) (5, 7) (b) (-5, -7) (c) (-5, 7) (d) (7, 7)

5 Solve the system of the following linear inequalities in $\mathbb{R} \times \mathbb{R}$:

$$x + 3y < 9, \quad x - 2y < 4, \quad 0 \leq x < 3$$

6 If $3\overrightarrow{M} + 5\overrightarrow{AB} = 3\overrightarrow{CB} - 2\overrightarrow{BA}$, prove that : $\overrightarrow{M} = \overrightarrow{CA}$

2

Cairo Governorate



**Shoubra Educational Zone
Mathematics Supervision**

1 Choose the correct answer from those given :

- (1) The length of the shadow of a tower of height 150 m. at the moment at which the elevation angle of the sun equals $30^\circ = \dots\dots\dots$ m.
- (a) $75\sqrt{3}$ (b) $200\sqrt{3}$ (c) $150\sqrt{3}$ (d) $75\sqrt{2}$
- (2) If X is a matrix, then $(X^T)^T - X = \dots\dots\dots$
- (a) O (b) X (c) 2X (d) 0
- (3) The direction vector of the straight line : $y = \frac{5}{4}x + 7$ is $\dots\dots\dots$
- (a) (5, 4) (b) (4, 5) (c) (-5, 4) (d) (5, -4)

(4) If A (2 , 5) , B (7 , -2) , then the X-axis divides $\overrightarrow{AB}$ by the ratio

- (a) 5 : 2 internally. (b) 2 : 3 internally.
(c) 3 : 2 internally. (d) 2 : 5 internally.

(5) If $A = \begin{pmatrix} 2 & -1 \\ 4 & -2 \end{pmatrix}$, then $A^2 = \dots\dots\dots$

- (a) $\begin{pmatrix} 2 & -1 \\ 4 & -2 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & 4 \\ -1 & -2 \end{pmatrix}$ (c) $O_{1 \times 1}$ (d) $O_{2 \times 2}$

(6) The perimeter of the circular sector in which its arc length equals 4 cm. and the diameter length of its circle equals 10 cm. = cm.

- (a) 14 (b) 20 (c) 30 (d) 10

2 Choose the correct answer from those given :

(1) The point which belongs to the solution set of the two inequalities :

$2x + y < 4$, $x + 3y < 6$ is

- (a) (1 , -4) (b) (2 , 1) (c) (1 , 2) (d) (3 , -1)

(2) $\begin{vmatrix} 3 & 5 & 3 \\ 4 & 8 & 4 \\ 7 & 2 & 7 \end{vmatrix} = \dots\dots\dots$

- (a) 0 (b) -1 (c) 1 (d) 3×48

(3) If $A = \begin{pmatrix} 3 & 7 \\ 5 & 6 \end{pmatrix}$, then $\begin{pmatrix} 1 & 7 \\ 5 & 4 \end{pmatrix} = \dots\dots\dots$

- (a) $A - 2$ (b) $A - 2I$ (c) $A + I$ (d) $A - I$

(4) $\frac{1 - \sin^2 \theta}{1 - \cos^2 \theta} = \dots\dots\dots$

- (a) -1 (b) 1 (c) $\tan^2 \theta$ (d) $\cot^2 \theta$

(5) The area of ΔABC in which : $AB = 7$ cm. , $BC = 8$ cm. , $m(\angle B) = 50^\circ$ equals cm^2 .

- (a) 21.4 (b) 42.9 (c) 18 (d) 33.4

(6) If $\vec{A} = (-1 , 5)$, $\vec{B} = (2 , 1)$, then $\|\vec{AB}\| = \dots\dots\dots$

- (a) 2 (b) 3 (c) 4 (d) 5

3 Choose the correct answer from those given :

(1) Measure of the angle included between the two straight lines :

$2x = 3$, $y = 4$ equals

- (a) 90° (b) 45° (c) 60° (d) 30°

(2) If $\begin{vmatrix} x & 12 \\ 3 & x \end{vmatrix} = \begin{vmatrix} 2 & 1 \\ 10 & 5 \end{vmatrix}$, then $x = \dots\dots\dots$

- (a) 2 (b) 5 (c) 6 (d) ± 6

(3) The area of the circular segment which the radius length of its circle is 8 cm. and the measure of its angle is $120^\circ \approx \dots\dots\dots \text{cm}^2$

- (a) 95 (b) 51 (c) 83 (d) 39

(4) If $A(-3, -7)$, $B(4, 0)$, then the point C which divides $\overline{AB}$ by the ratio 5 : 2 internally is $\dots\dots\dots$

- (a) $(-2, 2)$ (b) $(2, -2)$ (c) $(2, 2)$ (d) $(-2, -2)$

(5) In ΔABC : $\overrightarrow{BA} - \overrightarrow{BC} = \dots\dots\dots$

- (a) $\overrightarrow{BC}$ (b) $\overrightarrow{CB}$ (c) $\overrightarrow{CA}$ (d) $\overrightarrow{AC}$

(6) The length of the perpendicular segment from the origin point to the straight line : $3x - 4y - 15 = 0$ equal $\dots\dots\dots$ unit of length.

- (a) 3 (b) 4 (c) 5 (d) 15

4 Choose the correct answer from those given :

(1) In the system of the equations : $a_1x + b_1y = c_1$, $a_2x + b_2y = c_2$

, if $\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = 5$, $\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix} = -10$, $\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix} = 15$, then $(x, y) = \dots\dots\dots$

- (a) $(-2, 3)$ (b) $(3, -2)$ (c) $(-50, 75)$ (d) $(75, -50)$

(2) If the vector : $\vec{A} = (6\sqrt{2}, \frac{3\pi}{4})$, then $\vec{A} = \dots\dots\dots$

- (a) $(6, -6)$ (b) $(-6, 6)$ (c) $(6, 6)$ (d) $(-6, -6)$

(3) The solution set of the equation : $\sin^2 \theta + 1 = 0$, $\theta \in]0, \pi]$ is $\dots\dots\dots$

- (a) $\{\frac{\pi}{2}\}$ (b) $\{\frac{\pi}{4}\}$ (c) $\{\pi\}$ (d) $\emptyset$

(4) If $\vec{A} = (n, 1)$, $\vec{B} = n\vec{i} - 4\vec{j}$, $\vec{A} \perp \vec{B}$, then $n = \dots\dots\dots$

- (a) 2 (b) -2 (c) ± 2 (d) -4

(5) $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix} = \dots\dots\dots$

- (a) $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ (b) $\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ (c) $\begin{pmatrix} 0 \\ 0 \end{pmatrix}$ (d) impossible.

(6) If the point C divides $\overrightarrow{AB}$ by the ratio 5 : 7 externally , then $\frac{AC}{AB} = \dots\dots\dots$

- (a) $\frac{2}{7}$ (b) $\frac{7}{2}$ (c) $\frac{2}{5}$ (d) $\frac{5}{2}$

(7) If $\|k(3, 4)\| = 1$, then $k = \dots\dots\dots$

- (a) $\frac{1}{7}$ (b) $\frac{1}{25}$ (c) $\pm \frac{1}{5}$ (d) ± 5

5 ABCD is a parallelogram , where A (1 , 5) , B (0 , 2) , C (3 , 4) , find the coordinates of the point D

6 Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following inequalities graphically :

$$x \geq 0 \quad , \quad y \geq 0 \quad , \quad 2x + 4y \leq 4$$

3

Giza Governorate



Mathematics Inspection

1 Choose the correct answer from those given :

(1) If $A = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$ and $B = (2 \ 5)$, then $(BA)^t = \dots\dots\dots$

- (a) $\begin{pmatrix} 4 & 10 \\ -4 & -10 \end{pmatrix}$ (b) $\begin{pmatrix} 4 & -4 \\ 10 & -10 \end{pmatrix}$ (c) (-6) (d) (6)

(2) If O is the zero matrix of order 2×3 , then $\begin{pmatrix} 4 & 0 & -3 \\ -1 & 5 & 0 \end{pmatrix} + O = \dots\dots\dots$

- (a) I (b) 0

- (c) $\begin{pmatrix} 4 & 0 & -3 \\ -1 & 5 & 0 \end{pmatrix}$ (d) $\begin{pmatrix} -4 & 0 & 3 \\ 1 & -5 & 0 \end{pmatrix}$

(3) If A is a matrix of order 2×3 , then the number of elements in matrix A is $\dots\dots\dots$

- (a) 4 (b) 9 (c) 6 (d) 5

(4) Which of the following matrices has a multiplicative inverse ?

- (a) $\begin{pmatrix} 2 & 6 \\ 1 & 3 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & -3 \\ 2 & -3 \end{pmatrix}$ (c) $\begin{pmatrix} 3 & 3 \\ 3 & 3 \end{pmatrix}$ (d) $\begin{pmatrix} 3 & 0 \\ -3 & 1 \end{pmatrix}$

(5) If A is a matrix of order 3×3 and $|A| = 5$, then $|-A| = \dots\dots\dots$

- (a) -5 (b) zero (c) 5 (d) 25

(6) In the opposite figure :

Area of quadrilateral ABCD

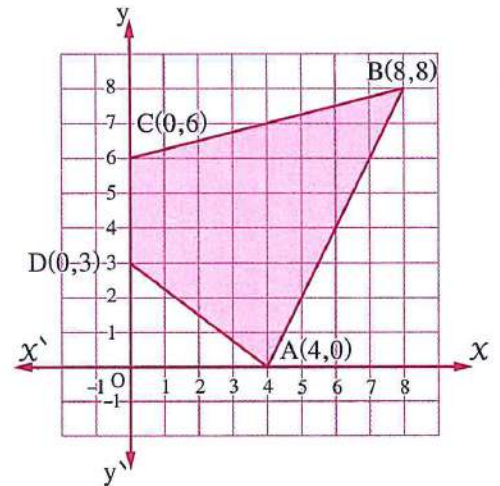
= square unit.

(a) 20

(b) 10

(c) 68

(d) 34



(7) If $A^{-1} = \begin{pmatrix} -1 & 2 \\ 1 & 3 \end{pmatrix}$, $AB = \begin{pmatrix} 4 & -2 \\ 0 & 1 \end{pmatrix}$, then $B = \dots\dots\dots$

(a) $\begin{pmatrix} 4 & -2 \\ 0 & 1 \end{pmatrix}$

(b) $\begin{pmatrix} 4 & -4 \\ -4 & 1 \end{pmatrix}$

(c) $\begin{pmatrix} -4 & 4 \\ 4 & 1 \end{pmatrix}$

(d) $\begin{pmatrix} -4 & 4 \\ -4 & 1 \end{pmatrix}$

2 Choose the correct answer from those given :

(1) In the opposite figure :

ABCD is a rectangle , E is midpoint of $\overline{AD}$

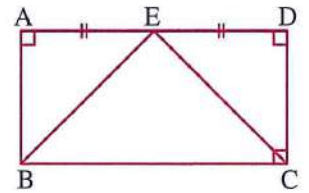
, then $\overrightarrow{EB} + \overrightarrow{BA} - \overrightarrow{DC} = \dots\dots\dots$

(a) $\overrightarrow{EB}$

(b) $\overrightarrow{BE}$

(c) $\overrightarrow{EC}$

(d) $\overrightarrow{CE}$



(2) If $\vec{L} = (2, -3)$ and $\vec{k} = (3, 1 - x)$ are parallel , then $x = \dots\dots\dots$

(a) 4

(b) $\frac{11}{2}$

(c) -1

(d) -9

(3) The polar form of the vector $\vec{A} = -3\vec{j}$ is $\dots\dots\dots$

(a) $(-3, \frac{\pi}{2})$

(b) $(3, \frac{\pi}{2})$

(c) $(-3, \frac{3\pi}{2})$

(d) $(3, \frac{3\pi}{2})$

(4) If ABCDEF is a regular hexagon whose centre (M) which of the following directed line segments are not equivalent ?

(a) $\overrightarrow{AB}, \overrightarrow{FM}$

(b) $\overrightarrow{AB}, \overrightarrow{ED}$

(c) $\overrightarrow{AB}, \overrightarrow{MC}$

(d) $\overrightarrow{AB}, \overrightarrow{MD}$

(5) If $\overrightarrow{AB} = \overrightarrow{CD}$ where $\overrightarrow{AB} = (6, 4)$, $\overrightarrow{C} = (-1, 3)$, then $\overrightarrow{D} = \dots\dots\dots$

(a) (5, 7)

(b) (-5, -7)

(c) (-5, 7)

(d) (7, 7)

(6) The point at which the function : $P = 35x + 10y$ has a minimum value from the following is $\dots\dots\dots$

(a) (0, 0)

(b) (0, 10)

(c) (0, 40)

(d) (20, 10)

3 Choose the correct answer from those given :

- (1) A circle of center $(2, -2)$, if one of the two ends of its diameter is $(4, 2)$, then the other end of this diameter is
- (a) $(-4, 2)$ (b) $(0, -6)$ (c) $(-3, -3)$ (d) $(8, 4)$
- (2) The straight line which makes a positive angle of measure $\frac{\pi}{4}$ with the positive direction of the X -axis, its direction vector =
- (a) $(0, 1)$ (b) $(1, 0)$ (c) $(-1, 1)$ (d) $(1, 1)$
- (3) The vector equation of the straight line which passes through the origin point and the point $(1, 2)$ is
- (a) $\vec{r} = k(1, 2)$ (b) $\vec{r} = k(2, 1)$
(c) $\vec{r} = (1, 2) + k(1, 0)$ (d) $\vec{r} = (1, 2) + k(0, 1)$
- (4) The measure of the angle between the straight lines whose equations are $X = 3$, $y = 4$ equals
- (a) 90° (b) 45° (c) 60° (d) 30°
- (5) The length of the perpendicular from the point $(-3, 5)$ to the X -axis equals length units.
- (a) 3 (b) 5 (c) 8 (d) -3
- (6) The distance between the two straight lines : $\vec{r} = (2, 0) + k(12, -5)$, $\vec{r} = (4.6, 0) + k(12, -5)$ equals length units.
- (a) 1 (b) 2 (c) 3 (d) 4

4 Choose the correct answer from those given :

- (1) The area of the isosceles triangle in which the length of its base is 6 cm. and the length of one of its legs is 5 cm. equal cm^2 .
- (a) 15 (b) 12 (c) 10 (d) 20
- (2) If $180^\circ < \theta < 360^\circ$ and $2 \cos \theta + 1 = 0$, then $\theta = \dots\dots\dots$
- (a) 210° (b) 240° (c) 300° (d) 330°
- (3) From the roof of a house 8 meters high, a person found that the elevation angle of the top of an opposite building was of measure 63° and observed the depression angle of its base, it was of measure 28° , then the height of the building to the nearest metre equals m.
- (a) 30 (b) 38 (c) 29 (d) 31
- (4) If the perimeter of a sector is 8 cm. and its arc is of length 2 cm., then its circle is of radius length cm.
- (a) 6 (b) 2 (c) 3 (d) 4

(5) The area of the circular segment whose chord length is 18 cm. and the radius length of its circle 18 cm. approximately equals cm^2

- (a) 29 (b) 28 (c) 30 (d) 60

(6) $\frac{1 - \cos^2 \beta}{\sin^2 \beta - 1}$ in the simplest form equals

- (a) $-\tan^2 \beta$ (b) $-\cos^2 \beta$ (c) $\tan^2 \beta$ (d) $\cot^2 \beta$

5 In any triangle XYZ , prove that : $\overrightarrow{XY} + \overrightarrow{YZ} + \overrightarrow{ZX} = \vec{O}$

6 Solve graphically the system of the following linear inequalities in $\mathbb{R} \times \mathbb{R}$:

$$x \leq 4 \quad , \quad y < x + 2 \quad , \quad x + 2y \geq -2$$

4

Giza Governorate



Awseem Educational Directorate
Mathematics Inspection

1 Choose the correct answer from those given :

(1) The area of the circular segment , the radius length of its circle is 8 cm. and the measure of its central angle is 120° approximately equals cm^2

- (a) 95 (b) 51 (c) 83 (d) 39

(2) The area of a quadrilateral is 30 cm^2 and the lengths of its diagonals are 10 cm. and 12 cm. , then the measure of the acute angle between its diagonals equals

- (a) 30° (b) 45° (c) 60° (d) 75°

(3) The area of a circular sector is 45 cm^2 and the length of the radius of its circle is 10 cm. , then its perimeter equals cm.

- (a) 19 (b) 29 (c) 39 (d) 49

(4) From the top of a rock 180 meters high from the sea level , the depression angle of a boat 300 metres apart from the base of the rock was measured , what is the radian measure of the depression angle ?

- (a) 0.5^{rad} (b) 0.54^{rad} (c) 0.57^{rad} (d) 0.6^{rad}

(5) If $0^\circ \leq x \leq 360^\circ$, then the number of solutions of the equation : $2 \sin x - 1 = 0$ is

- (a) 1 (b) 2 (c) 3 (d) 4

(6) $2 \cot^2 x - 2 \csc^2 x = \dots\dots\dots$

- (a) 2 (b) 1 (c) -1 (d) -2

(7) The point lies in the region of the solution set of the inequalities :

$$3x + y \geq 5 \quad , \quad x \geq 0 \quad , \quad y \leq 0$$

- (a) (-1 , 8) (b) (1 , -4) (c) (2 , -1) (d) (2 , 4)

2 Choose the correct answer from those given :

(1) If $A \times \begin{pmatrix} 1 & 2 \\ -1 & 1 \end{pmatrix} = I$, then the value of determinant A =

- (a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

(2) If $\begin{pmatrix} x-1 & 4 \\ 2 & x+1 \end{pmatrix}$ has no multiplicative inverse, then $x = \dots\dots\dots$

- (a) 3 (b) -3 (c) 8 (d) ± 3

(3) The surface area of the triangle whose vertices are A (2, 4), B (-2, 4), C (0, -2) equals square unit.

- (a) 11 (b) 12 (c) 13 (d) 14

(4) If $\begin{vmatrix} x^2 & 5 \\ 3 & x \end{vmatrix} = 12$, then $x = \dots\dots\dots$

- (a) 15 (b) 3 (c) 12 (d) 27

(5) If A is a matrix of order 2×3 and AB is defined as a matrix of order 2×1 , then B is a matrix of order

- (a) 3×2 (b) 2×1 (c) 3×1 (d) 2×2

(6) If $A + A^t = O$ the A is a matrix.

- (a) row (b) column (c) symmetric (d) skew symmetric

3 Choose the correct answer from those given :

(1) If A is a diagonal matrix of order 3×3 and if $a_{xy} = 2$ for every $x = y$, then A =

- (a) I (b) $2I$ (c) $6O$ (d) $2O$

(2) If $\vec{A} = (4, 2)$, $\vec{B} = (1, -2)$, then $\|\vec{A} - \vec{B}\| = \dots\dots\dots$

- (a) 3 (b) 4 (c) 5 (d) 7

(3) If $\vec{A} = (k, 9)$ is parallel to $\vec{B} = (-4, 3)$, then $k = \dots\dots\dots$

- (a) -4 (b) -3 (c) -12 (d) 12

(4) If $\vec{A} = (6\sqrt{2}, 135^\circ)$ is a position vector of point A, then A =

- (a) (6, -6) (b) (-6, 6) (c) (6, 6) (d) (-6, -6)

(5) If ABC is a triangle, then $\vec{AB} + \vec{BC} + \vec{AC} = \dots\dots\dots$

- (a) $\vec{O}$ (b) $2\vec{AC}$ (c) $2\vec{CA}$ (d) $\vec{AC}$

(6) If $\vec{A} = (-1, 5)$, $\vec{B} = (2, 1)$, then $\|\vec{AB}\| = \dots\dots\dots$

- (a) 2 (b) 3 (c) 4 (d) 5

4 Choose the correct answer from those given :

- (1) If $A = (-3, -7)$, $B = (4, 0)$, then point C which divides $\overline{AB}$ internally in the ratio 5 : 2 is
- (a) $(-2, 3)$ (b) $(2, -2)$ (c) $(2, 2)$ (d) $(-2, -2)$
- (2) If the slope of the straight line $(3a + 1)x - 2ay + 3 = 0$ equals 2, then $a = \dots\dots\dots$
- (a) 1 (b) -1 (c) $\frac{5}{3}$ (d) $-\frac{1}{2}$
- (3) If the two straight lines : $3x - 2y + 7 = 0$ and $kx + 3y + 5 = 0$ are perpendicular, then $k = \dots\dots\dots$
- (a) 1 (b) 2 (c) -2 (d) -1
- (4) The measure of the acute angle between the two straight lines : $2x + 3y = 15$ and $\vec{r} = (-2, 1) + k(1, -3)$ equals approximately°
- (a) 52 (b) 51 (c) 39 (d) 38
- (5) The length of the perpendicular drawn from the origin point to the straight line $3x - 4y - 15 = 0$ equals length unit.
- (a) 15 (b) 5 (c) 3 (d) 4
- (6) The equation of the straight line passing through the origin point and the point of intersection of the two straight lines : $x = 2$ and $y = 5$ is
- (a) $5x - 2y = 0$ (b) $2x + 5y = 0$ (c) $2x - 5y = 0$ (d) $5x + 2y = 0$

5 Represent the following system of inequalities graphically :

$x \geq 0$, $y \geq 0$, $2x + y \leq 10$, $x + 4y \leq 12$, then find the value of x and y which make the objective function $P = 2x + 3y$ has maximum value.

6 If $\vec{A} = (-2, 4)$, $\vec{B} = (3, -2)$, then find : $\|5\vec{A} + 3\vec{B}\|$

5

Alexandria Governorate



**Montazah Educational Zone
Math Inspection**

1 Choose the correct answer from those given :

- (1) The value of determinant $\begin{vmatrix} \sin 45^\circ & -\cos 45^\circ \\ \cos 45^\circ & \sin 45^\circ \end{vmatrix} = \dots\dots\dots$
- (a) 1 (b) -1 (c) 5 (d) -5
- (2) If $\begin{pmatrix} 4 & 2x-1 \\ 1 & 3 \end{pmatrix} = \begin{pmatrix} 4 & 1 \\ 5 & 3 \end{pmatrix}^t$, then $x = \dots\dots\dots$
- (a) 1 (b) 2 (c) 3 (d) 4

(3) $\begin{pmatrix} 4 & 1 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ -3 & x \end{pmatrix} = I$, then $x = \dots\dots\dots$

- (a) 1 (b) 2 (c) 3 (d) 4

(4) If A (1 , 6) , B (0 , 10) , C (0 , 0) , then the area of the triangle ABC equals square unit.

- (a) 5 (b) 10 (c) 15 (d) 20

(5) The matrix $\begin{pmatrix} x & 1 \\ 2 & x+1 \end{pmatrix}$ has no multiplicative inverse at $x = \dots\dots\dots$

- (a) 1 (b) -2 (c) 1 , -2 (d) -1 , 2

(6) If $\begin{vmatrix} 4 & 0 & 0 \\ 7 & 2 & 0 \\ 1 & 5 & 1 \end{vmatrix} = x - 7$, then $x = \dots\dots\dots$

- (a) 8 (b) 7 (c) 15 (d) 1

2 Choose the correct answer from those given :

(1) If $x + \begin{pmatrix} -2 & 5 \\ 0 & -7 \end{pmatrix} = I$, then $x = \dots\dots\dots$

- (a) $\begin{pmatrix} 3 & -5 \\ 0 & 8 \end{pmatrix}$ (b) $\begin{pmatrix} 3 & -5 \\ 0 & -8 \end{pmatrix}$ (c) $\begin{pmatrix} -3 & -5 \\ 0 & 8 \end{pmatrix}$ (d) $\begin{pmatrix} -3 & 5 \\ 0 & -8 \end{pmatrix}$

(2) The point at which the function $P = 40x + 20y$ has a maximum value from the following is

- (a) (0 , 0) (b) (0 , 40) (c) (15 , 10) (d) (25 , 0)

(3) If the area of a regular hexagon is $54\sqrt{3} \text{ cm}^2$, then its side length equals cm^2

- (a) 6 (b) 12 (c) $6\sqrt{3}$ (d) $12\sqrt{3}$

(4) If $\theta \in]0 , 2\pi[$ and $\cos \theta + 1 = 0$, then $\theta = \dots\dots\dots$

- (a) $\frac{\pi}{2}$ (b) π (c) $\frac{3\pi}{2}$ (d) 2π

(5) The area of the circular sector whose perimeter is 10 cm. and the length of its arc is 2 cm. equals cm^2

- (a) 4 (b) 8 (c) 10 (d) 20

(6) The area of equilateral triangle whose side length is 6 cm. equals cm^2

- (a) $36\sqrt{3}$ (b) $18\sqrt{3}$ (c) $9\sqrt{3}$ (d) $6\sqrt{3}$

3 Choose the correct answer from those given :

- (1) The measure of the angle between the two straight lines : $X - 2y + 1 = 0$
 , $3X - y + 6 = 0$ equals°
(a) 90 (b) 60 (c) 45 (d) 30
- (2) The vector equation of the straight line $X - 3y = 5$ is
(a) $\vec{r} = (8, 1) + k(1, 3)$ (b) $\vec{r} = (8, 1) + k(3, 1)$
(c) $\vec{r} = (8, 1) + k(-3, 1)$ (d) $\vec{r} = (8, 1) + k(-3, 5)$
- (3) The equation of the straight line which passes through the point $(2, -5)$ and parallel to X-axis is
(a) $X + 2 = 0$ (b) $y + 5 = 0$ (c) $y - 2 = 0$ (d) $y - 5 = 0$
- (4) If ABC is a triangle then : $\vec{AB} + \vec{BC} + \vec{AC} = \dots\dots\dots$
(a) $\vec{O}$ (b) $\vec{AC}$ (c) $2\vec{AC}$ (d) $\vec{BC}$
- (5) If $\vec{A} = (3k, 4k)$ is a unit vector , then $k = \pm \dots\dots\dots$
(a) $\frac{1}{5}$ (b) $\frac{1}{7}$ (c) 5 (d) 7
- (6) If $\vec{XY} = (2, 3)$, $\vec{YZ} = (4, 5)$, then $\vec{XZ} = \dots\dots\dots$
(a) $(6, 8)$ (b) $(2, 2)$ (c) $(8, 8)$ (d) $(4, 3)$

4 Choose the correct answer from those given :

- (1) The length of the perpendicular drawn from the point $(-2, 3)$ to the straight line whose equation is $3X - 4y - 2 = 0$ equals length unit.
(a) 3 (b) 4 (c) 5 (d) 6
- (2) The perimeter of the triangle enclosed by the X-axis and y-axis and the straight line $3X + 4y = 12$ equals length unit.
(a) 6 (b) 7 (c) 10 (d) 12
- (3) A light pole of height 8 meters gives shade on the ground of length 5 meters , then the measure of the elevation angle of the sun at that moment to the nearest degree equals
(a) 32° (b) 51° (c) 39° (d) 58°
- (4) The simplest form of : $\sin X \cos X \cot X + \sin^2 X = \dots\dots\dots$
(a) -1 (b) zero (c) 1 (d) 2
- (5) If $\vec{A} = (3, -2)$, $\vec{B} = (-2, k)$ and $\vec{A} \parallel \vec{B}$, then $k = \dots\dots\dots$
(a) -2 (b) 3 (c) $\frac{4}{3}$ (d) $-\frac{4}{3}$

(6) The polar form of the vector : $\vec{A} = -12\vec{i} - 12\vec{j}$ is

- (a) $(12, \frac{\pi}{4})$ (b) $(12\sqrt{3}, \frac{\pi}{4})$ (c) $(12\sqrt{2}, \frac{3\pi}{4})$ (d) $(12\sqrt{2}, \frac{5\pi}{4})$

(7) If C = (4, 6) is the midpoint of $\overline{AB}$ where B = (2, 8), then A =

- (a) (6, 4) (b) (6, 14) (c) (3, 7) (d) (2, -2)

5 Solve graphically the linear inequalities in $\mathbb{R} \times \mathbb{R}$:

$$x \geq 0, y \geq 0, 3x + 2y \leq 6, 2x + 4y \leq 8$$

6 ABCD is quadrilateral in which $\overrightarrow{BC} = \frac{1}{2} \overrightarrow{AD}$, prove that : $\overrightarrow{AC} + \overrightarrow{BD} = \frac{3}{2} \overrightarrow{AD}$

6 El-Kalyoubia Governorate



Mathematics Supervision

1 Choose the correct answer from those given :

(1) $\begin{pmatrix} -5 & -2 \\ 4 & 7 \end{pmatrix} + \begin{pmatrix} 6 & -4 \\ 2 & -6 \end{pmatrix}^t = \dots\dots\dots$

- (a) O (b) $\begin{pmatrix} 1 & -4 \\ 0 & 1 \end{pmatrix}$ (c) $\begin{pmatrix} 11 & 0 \\ 0 & 1 \end{pmatrix}$ (d) I

(2) The multiplicative inverse of the matrix $\begin{pmatrix} 2 & 3 \\ -1 & 2 \end{pmatrix}$ equals

- (a) I (b) $\begin{pmatrix} 2 & -1 \\ 3 & 2 \end{pmatrix}$ (c) $\begin{pmatrix} 2 & 3 \\ -1 & 2 \end{pmatrix}$ (d) $\begin{pmatrix} \frac{2}{7} & -\frac{3}{7} \\ \frac{1}{7} & \frac{2}{7} \end{pmatrix}$

(3) If the matrix A of order 3×2 and the matrix AB of order 3×1 , then matrix B of order

- (a) 2×1 (b) 3×1 (c) 3×3 (d) 2×3

(4) $\frac{3}{1 + \tan^2 \theta} + 3 \sin^2 \theta = \dots\dots\dots$

- (a) 3 (b) 1 (c) $3 \sin^2 \theta$ (d) $\sec^2 \theta$

(5) If A (3, 5), B (2, 0), C (-3, 3), then the area of the triangle ABC equals square unit.

- (a) 28 (b) 14 (c) 7 (d) 2

(6) If $\begin{pmatrix} 4 & 1 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ -3 & x \end{pmatrix} = I$, then $x = \dots\dots\dots$

- (a) 3 (b) 4 (c) -3 (d) -4

2 Choose the correct answer from those given :

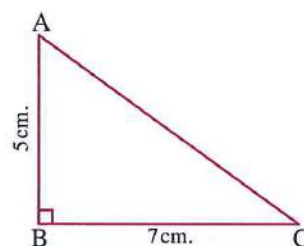
- (1) The possible value of a which makes the determinant $\begin{vmatrix} 1 & 3 & -1 \\ -2 & a & 3 \\ 5 & 6 & -2 \end{vmatrix} = 0$ is
- (a) 2 (b) -2 (c) -9 (d) 9
- (2) The point which belongs to the solution set of the inequality : $x + y \leq 3$ is
- (a) (1, 3) (b) (2, -3) (c) (2, 3) (d) (1, 4)
- (3) If $A \times \begin{pmatrix} 3 & -1 \\ 2 & -1 \end{pmatrix} = I$, then $A =$
- (a) $\begin{pmatrix} -1 & 3 \\ -1 & 2 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & -1 \\ 3 & -1 \end{pmatrix}$ (c) $\begin{pmatrix} -1 & 1 \\ -2 & 3 \end{pmatrix}$ (d) $\begin{pmatrix} 1 & -1 \\ 2 & -3 \end{pmatrix}$
- (4) From a point on the ground surface 35 m. away from the base of a house, a man measures the elevation angle of the top of the house, its measure was 45° , then the height of the house is m.
- (a) 45 (b) 35 (c) 25 (d) 55
- (5) $2 \sin \theta - \sqrt{3} = 0$ where $90^\circ \leq \theta \leq 270^\circ$, then $\theta =$
- (a) 60° (b) 120° (c) 240° (d) 300°
- (6) Area of ΔABC in which $AB = 5$ cm., $AC = 4$ cm., $m(\angle A) = 60^\circ$ equals cm^2 .
- (a) $5\sqrt{2}$ (b) $5\sqrt{3}$ (c) 5 (d) 10

3 Choose the correct answer from those given :

(1) In the opposite figure :

$m(\angle C) \approx$ to the nearest degree.

- (a) 30 (b) 35
(c) 36 (d) 45



- (2) A circular sector, its perimeter 10 cm. and length of its arc is 2 cm., then its area equals cm^2 .
- (a) 4 (b) 8 (c) 10 (d) 20
- (3) A regular hexagon its surface area is $54\sqrt{3} \text{ cm}^2$, then its side length = cm.
- (a) 3 (b) 4 (c) 5 (d) 6
- (4) If $\vec{A} = (3, k)$, $\vec{B} = (2, -3)$ and $\vec{A} \perp \vec{B}$, then $k =$
- (a) 3 (b) 2 (c) -2 (d) -3

(5) If $\vec{A} = 2\vec{i} + 3\vec{j}$, $\vec{B} = \vec{i} - 2\vec{j}$, then $2\vec{A} + 3\vec{B} = \dots\dots\dots$

- (a) $7\vec{i}$ (b) $5\vec{i}$ (c) $3\vec{i}$ (d) $2\vec{i}$

(6) If $\vec{XY} = (2, 3)$, $\vec{YZ} = (4, 5)$, then $\vec{XZ} = \dots\dots\dots$

- (a) (6, 8) (b) (2, 2) (c) (8, 8) (d) (4, 3)

4 Choose the correct answer from those given :

(1) If $\vec{A} = (3, -2)$, $\vec{B} = (7, 1)$, then $\|\vec{A} + 2\vec{B}\| = \dots\dots\dots$ length unit.

- (a) $\sqrt{13}$ (b) $5\sqrt{2}$ (c) 11 (d) 17

(2) If $\vec{A} = -2\vec{i} - 2\vec{j}$, then the polar form of $\vec{A}$ is $\dots\dots\dots$

- (a) $(2\sqrt{2}, \frac{\pi}{4})$ (b) $(2\sqrt{2}, \frac{3\pi}{4})$ (c) $(2\sqrt{2}, \frac{5\pi}{4})$ (d) $(2\sqrt{2}, \frac{7\pi}{4})$

(3) If the slope of a straight line $= \frac{-2}{3}$, then its direction vector is $\dots\dots\dots$

- (a) (3, -2) (b) (-3, 2)
(c) (6, -4) (d) all the previous answers are correct.

(4) The ratio by which the X-axis divides $\vec{AB}$ where $A = (2, 4)$ and $B = (7, -3)$ is $\dots\dots\dots$

- (a) 4 : 3 internally. (b) 2 : 7 internally. (c) 3 : 4 externally. (d) 4 : 3 externally.

(5) The measure of the angle between the two straight lines $L_1 : 2x + y + 5 = 0$ and $L_2 : \vec{r} = (1, 4) + k(3, -6)$ equals $= \dots\dots\dots^\circ$

- (a) 90 (b) 45 (c) 60 (d) zero

(6) The distance between the two parallel straight lines : $\vec{r} = (4, 0) + k(4, 3)$, $a\,x - 8y + 4 = 0$ equals $\dots\dots\dots$ length unit.

- (a) 20 (b) 0.2 (c) 28 (d) 2.8

(7) The direction vector of the straight line whose parametric equations are $x + 3 = 2k$, $y = 5$ is $\dots\dots\dots$

- (a) (2, 0) (b) (2, -3) (c) (2, 3) (d) (2, 5)

5 Find the S.S. of the following system of inequalities :

$x \geq 0$, $y \geq 0$, $x + 2y \leq 8$, $3x + 2y \leq 12$, then find (x, y) which makes R as great as possible where $R = 50x + 75y$

6 ABCD is quadrilateral in which $\vec{BC} = 3\vec{AD}$, prove that : $\vec{AC} + \vec{BD} = 4\vec{AD}$



1 Choose the correct answer from those given :

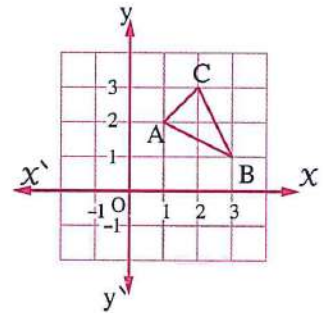
(1) If $\begin{vmatrix} x^2 & 5 \\ 3 & x \end{vmatrix} = 12$, then : $x = \dots\dots\dots$

- (a) 15 (b) 3 (c) 12 (d) 27

(2) In the opposite figure :

Area of $\triangle ABC = \dots\dots\dots$ area units.

- (a) - 3
(b) - 1.5
(c) 1.5
(d) 3



(3) The matrix $\begin{pmatrix} x+3 & 0 \\ 2 & x-3 \end{pmatrix}$ has no multiplicative inverse at $x = \dots\dots\dots$

- (a) 3 only. (b) ± 3 (c) 5 only. (d) ± 5

(4) The point which belongs to the solution set of the inequalities :

$2x + y < 4$, $x + 3y < 6$ is $\dots\dots\dots$

- (a) (1, -4) (b) (2, 1) (c) (1, 2) (d) (3, -1)

(5) If $\begin{pmatrix} 2 & 4 \\ -3 & 5 \end{pmatrix} + \begin{pmatrix} 1 & -3 \\ 2 & 6 \end{pmatrix}^t = \begin{pmatrix} 3k & -y \\ 2x & 11 \end{pmatrix}$, then $x + y + k = \dots\dots\dots$

- (a) -3 (b) -6 (c) 1 (d) -8

(6) $\begin{pmatrix} 4 & 2 & -1 \end{pmatrix} \begin{pmatrix} 5 \\ -6 \\ 8 \end{pmatrix} = \dots\dots\dots$

- (a) $\begin{pmatrix} 20 & -12 & -8 \end{pmatrix}$ (b) $\begin{pmatrix} 20 \\ -12 \\ -8 \end{pmatrix}$

- (c) (0) (d) not possible.

2 Choose the correct answer from those given :

(1) If $\begin{pmatrix} 4 & 1 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ -3 & x \end{pmatrix} = I$, then $x = \dots\dots\dots$

- (a) 3 (b) 4 (c) -3 (d) -4

(2) If $\sqrt{2} \cos \theta + 1 = 0$, where θ is the measure of the greatest positive angle, $\theta \in [0, 2\pi[$, then $\theta = \dots\dots\dots$

- (a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{4}$ (d) $\frac{7\pi}{4}$

- (3) From the top of a rock 100 metres high, the depression angle of the boat which is 200 m. away from the base of the rock equals (in radian) $\approx$ rad.
 (a) 0.08 (b) 0.46 (c) 0.25 (d) 0.24
- (4) If the perimeter of a sector is 8 cm. and its arc is of length 2 cm., then its circle is of radius length cm.
 (a) 6 (b) 2 (c) 3 (d) 4
- (5) The area of the regular pentagon whose side length is 10 cm. $\approx$ cm^2
 (a) 172.05 (b) 90.82 (c) 688.19 (d) 137.64
- (6) If the matrix A of order 2×3 , matrix B^t of order 1×3 , then the matrix $A \times B$ of order
 (a) 3×1 (b) 2×1 (c) 1×2 (d) 3×3

3 Choose the correct answer from those given :

- (1) If $\vec{A} = (12, 18)$, then $\frac{2}{3} \vec{A} =$
 (a) (8, 12) (b) (12, 8) (c) (6, 4) (d) (18, 27)
- (2) If $\vec{AB} = (2, 3)$, $\vec{CB} = (-3, 5)$, then $\vec{AC} =$
 (a) (5, -2) (b) (-8, 1) (c) (-2, 5) (d) (2, 5)
- (3) If $\vec{A} = (2, -1)$, $\vec{B} = (3, 4)$, $\vec{C} = (k, 15)$ and the two vectors $\vec{C}$, $\vec{B} - \vec{A}$ are parallel, then $k =$
 (a) 1 (b) 2 (c) 3 (d) 4
- (4) If $\vec{A} = (7, 0)$, $\vec{B} = (5\sqrt{2}, \frac{3\pi}{4})$, then $\|\vec{AB}\| =$ length unit.
 (a) 12 (b) 13 (c) 14 (d) $\sqrt{29}$
- (5) A circle of center (2, -2), if one of the two ends of its diameter is (4, 2), then the other end of this diameter is
 (a) (-4, 2) (b) (0, -6) (c) (-3, -3) (d) (8, 4)
- (6) If $A = (-4, 4)$, $B = (5, -8)$, $C \in \overline{AB}$ such that $CB : AC = 1 : 2$, then $C =$
 (a) (4, -8) (b) (2, -4) (c) (-8, 4) (d) (-4, 2)

4 Choose the correct answer from those given :

- (1) If the slope of the straight line : $(3a + 1)x - 2ay + 3 = 0$ equals 2, then $a =$
 (a) 1 (b) -1 (c) $\frac{5}{3}$ (d) $-\frac{1}{2}$
- (2) If the slope of a straight line $= -\frac{2}{3}$, then its direction vector is
 (a) (3, -2) (b) (-3, 2)
 (c) (6, -4) (d) all the pervious right.

(3) The vector equation of the straight line which passes through the point $(-4, 3)$ and its direction vector is $(2, 5)$ is

- (a) $\vec{r} = (2, 5) + k(-4, 3)$ (b) $\vec{r} = (-4, 3) + k(2, 5)$
 (c) $\vec{r} = (-4, 3) + k(5, 2)$ (d) $\vec{r} = (2, 5) + k(3, -4)$

(4) The measure of the acute angle between the two straight lines $L_1 : \vec{r} = (2, 5) + k(-3, 1)$, $L_2 : 2x = 3 - y$ equals

- (a) 30° (b) 45° (c) 60° (d) 50°

(5) The length of the perpendicular drawn from the point $(-2, -4)$ to the straight line $\vec{r} = (3, 0) + k(6, 8)$ equals length units.

- (a) 1.6 (b) 2.6 (c) 0.6 (d) 3.6

(6) If $\vec{A} = 3\vec{i} + k\vec{j}$ and $\|\vec{A}\| = 5$, then $k = \dots\dots\dots$

- (a) 4 (b) -4 (c) ± 4 (d) 2

(7) If $X = \begin{pmatrix} 2 & 4 \\ -4 & 3 \end{pmatrix}$, then $X^2 - 5X = \dots\dots\dots$

- (a) I (b) $-22I$ (c) X^t (d) $22I$

5 Find the different forms of the equation of the straight line which :

Passes through the point $P = (3, -1)$ and the vector $\vec{u} = (-3, 5)$ is a direction vector to it.

6 Under the conditions $x + y \leq 5$, $y \geq 1$, $x \geq 2$ Find x, y that makes the objective function $P = 2x + 3y$ is as small as possible.

8

El-Monofia Governorate



Al-Bagur Educational Zone
Math Supervision

1 Choose the correct answer from those given :

(1) If the matrix A of order 2×3 , matrix B^t of order 1×3 , then the matrix $A \times B$ of order

- (a) 2×1 (b) 3×1 (c) 1×2 (d) 3×3

(2) The value of the determinant $\begin{vmatrix} 4 & 0 & 0 \\ 7 & 1 & 0 \\ 2 & 5 & 3 \end{vmatrix} = \dots\dots\dots$

- (a) 12 (b) 1 (c) 4 (d) 8

(3) The matrix $\begin{pmatrix} x & 2 \\ 8 & x \end{pmatrix}$ has no multiplicative inverse when $x = \dots\dots\dots$

- (a) ± 4 (b) 2 (c) 4 (d) -4

(4) If $\begin{pmatrix} 4 & 1 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ -3 & x \end{pmatrix} = I$, then $x = \dots\dots\dots$

- (a) 1 (b) 4 (c) 2 (d) 3

(5) The point which makes the function $P = 40x + 20y$ has maximum value from the following is $\dots\dots\dots$

- (a) (25, 0) (b) (0, -4) (c) (15, 10) (d) (0, 0)

(6) If B is skew symmetric matrix, then the additive inverse of the matrix $B = \dots\dots\dots$

- (a) B (b) $-B^t$ (c) B^t (d) I

2 Choose the correct answer from those given :

(1) If $\begin{pmatrix} 3 & 5 \\ x & 3 \end{pmatrix} = \begin{pmatrix} 3 & 5 \\ 7 & y+1 \end{pmatrix}$, then $x + y = \dots\dots\dots$

- (a) 9 (b) 4 (c) 7 (d) 5

(2) The point which belongs to the solution set of the inequalities :

$x > 2$ and $y > 1$ and $x + y \geq 2$ is $\dots\dots\dots$

- (a) (2, 1) (b) (1, 2) (c) (1, 3) (d) (3, 2)

(3) $\sin^2 \theta + \cos^2 \theta + \tan^2 \theta = \dots\dots\dots$

- (a) $\sec^2 \theta$ (b) $\tan^2 \theta$ (c) $\cos^2 \theta$ (d) $\csc^2 \theta$

(4) The area of a regular pentagon of side length 5 cm. $\approx \dots\dots\dots \text{cm}^2$

(Approximated to the nearest cm^2)

- (a) 43 (b) 42 (c) 40 (d) 44

(5) If $2 \sin x - \sqrt{3} = 0$, where $90^\circ < x < 270^\circ$, then $x = \dots\dots\dots^\circ$

- (a) 120 (b) 60 (c) 300 (d) 240

(6) From a point at a distant 8 meters from the base of a tree, the angle of elevation of the top of the tree is 60° , then the height of the tree = $\dots\dots\dots$ meter.

- (a) 4 (b) $8\sqrt{3}$ (c) $4\sqrt{3}$ (d) 8

3 Choose the correct answer from those given :

(1) The area of a circular sector whose perimeter 12 cm. and its arc of length 6 cm.

= $\dots\dots\dots \text{cm}^2$

- (a) 9 (b) 6 (c) 12 (d) 18

(2) If the measure of the central angle of a circular segment is 90° and its area equals 56 cm^2

, then the radius length of its circle approximately equals $\dots\dots\dots \text{cm}$.

- (a) 9.9 (b) 19.8 (c) 14 (d) 7

- (3) The polar form of the vector $\overrightarrow{OA} = (4, 4)$ is
- (a) $(4\sqrt{2}, 45^\circ)$ (b) $(4, 45^\circ)$ (c) $(8, 60^\circ)$ (d) $(8, 45^\circ)$
- (4) A triangle ABC, if D is the midpoint of $\overline{BC}$, then $\overrightarrow{BA} + \overrightarrow{CA} + \overrightarrow{AD} = \dots\dots\dots$
- (a) $\overrightarrow{BC}$ (b) $\overrightarrow{CB}$ (c) $2\overrightarrow{DA}$ (d) $\overrightarrow{DA}$
- (5) If $\|6\overrightarrow{A}\| = 2\|k\overrightarrow{A}\|$, then $k = \dots\dots\dots$
- (a) ± 3 (b) -3 (c) 3 (d) 12
- (6) If $(6, 4)$ and $(3, m)$ are two perpendicular vectors, then $m = \dots\dots\dots$
- (a) -4.5 (b) -2 (c) 8 (d) ± 3

4 Choose the correct answer from those given :

- (1) A triangle ABC, $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{AC} = \dots\dots\dots$
- (a) $2\overrightarrow{AC}$ (b) $\overrightarrow{AC}$ (c) $\vec{O}$ (d) $\overrightarrow{BC}$
- (2) The equation of the straight line which passes through the point $(2, -5)$ and parallel to X-axis is
- (a) $x + 2 = 0$ (b) $y + 5 = 0$ (c) $x - 2 = 0$ (d) $y - 5 = 0$
- (3) Area of the triangle bounded by X-axis and y-axis and the straight line $2x + 3y = 6$ equal square units.
- (a) 3 (b) 6 (c) 2 (d) 12
- (4) The measure of the angle between the two straight lines whose slopes are 3 and $-\frac{1}{3}$ is°
- (a) 45 (b) 30 (c) 90 (d) 60
- (5) The length of the perpendicular drawn from the origin point to the straight line : $3x - 4y - 15 = 0$ equal length unit.
- (a) 3 (b) 5 (c) 15 (d) 4
- (6) If $A = (2, 3)$, $B = (5, 6)$, the point C divides $\overline{AB}$ by the ratio $2 : 1$ internally, then $C = \dots\dots\dots$
- (a) $(5, 4)$ (b) $(3, -4)$ (c) $(2, 1)$ (d) $(4, 5)$
- (7) If the point $(3, 6)$ is the midpoint of $\overline{AB}$ where $A = (-3, 7)$, then $B = \dots\dots\dots$
- (a) $(9, 5)$ (b) $(-6, 1)$ (c) $(6, -1)$ (d) $(0, 6)$

5 ABC is a triangle in which : $D \in \overline{BC}$ and $\overrightarrow{BD} = 4\overrightarrow{DC}$, prove that : $\overrightarrow{AB} + 4\overrightarrow{AC} = 5\overrightarrow{AD}$

6 Represent the solution set of the inequality : $2x + 3y \leq 6$ in $\mathbb{R} \times \mathbb{R}$ graphically.


1 Choose the correct answer from those given :

(1) If A is a square matrix , then $A + A^t$ is matrix.

- (a) symmetric. (b) skew symmetric.
(c) diagonal. (d) zero

(2) The value of the determinant $\begin{vmatrix} 5 & 0 & 0 \\ 7 & 2 & 0 \\ -3 & 6 & 1 \end{vmatrix} = \dots\dots\dots$

- (a) 0 (b) 6 (c) 10 (d) 5

(3) If $\vec{A} = (6, 8)$, $\vec{B} = (3, k)$, $\vec{C} = (m, 9)$ and $\vec{A} \parallel \vec{B}$, $\vec{B} \perp \vec{C}$, then $k - m = \dots\dots\dots$

- (a) -16 (b) 16 (c) -8 (d) 8

(4) If $\vec{A} = (2, 3)$, $\vec{B} = (3, -1)$, then $\|2\vec{A} - \vec{B}\| = \dots\dots\dots$

- (a) 50 (b) $2\sqrt{5}$ (c) $5\sqrt{2}$ (d) 25

(5) $\frac{1 - \cos^2 \theta}{\sin^2 \theta - 1}$ in the simplest form =

- (a) $\cot^2 \theta$ (b) $\tan^2 \theta$ (c) 1 (d) $-\tan^2 \theta$

(6) If $A = (1, 3)$, $B = (-4, -2)$, then the coordinate of the point C which divides $\vec{AB}$ internally in a ratio 2 : 3 is

- (a) (1, 1) (b) (-1, 1) (c) (-1, -1) (d) (1, -1)

2 Choose the correct answer from those given :

(1) If (3, -5) is a direction vector of a straight line , then its slope equals

- (a) $\frac{5}{3}$ (b) $-\frac{5}{3}$ (c) $\frac{3}{5}$ (d) $-\frac{3}{5}$

(2) If A, B are two matrices , $B \times A = \begin{pmatrix} 3 & 2 \\ -6 & 5 \end{pmatrix}$, then $A^t B^t = \dots\dots\dots$

- (a) $\begin{pmatrix} -1 & -6 \\ 3 & 2 \end{pmatrix}$ (b) $\begin{pmatrix} 3 & 2 \\ -6 & 5 \end{pmatrix}$ (c) $\begin{pmatrix} 3 & -6 \\ 2 & 5 \end{pmatrix}$ (d) $\begin{pmatrix} 2 & 5 \\ 3 & 4 \end{pmatrix}$

(3) If $A = \begin{pmatrix} 3 & 2 \\ 3 & -2 \end{pmatrix}$, then $A^{-1} = \dots\dots\dots$

- (a) $\begin{pmatrix} -2 & -2 \\ -3 & 3 \end{pmatrix}$ (b) $\begin{pmatrix} \frac{1}{6} & \frac{1}{3} \\ \frac{1}{5} & -\frac{1}{2} \end{pmatrix}$ (c) $\begin{pmatrix} -2 & 2 \\ -3 & 3 \end{pmatrix}$ (d) $\begin{pmatrix} \frac{1}{6} & \frac{1}{6} \\ \frac{1}{4} & -\frac{1}{4} \end{pmatrix}$

(4) The area of a circular sector, radius length of its circle is 3.5 cm. and the measure of its central angle is $30^\circ \approx \dots\dots\dots \text{cm}^2$.

- (a) 3 (b) 30 (c) 5 (d) 50

(5) If $\vec{OA}$ is the position vector of the point A, $\vec{OA} = (12, 30^\circ)$, then the coordinate of A is $\dots\dots\dots$

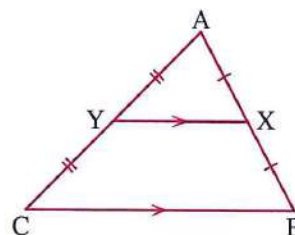
- (a) $(6, 6\sqrt{3})$ (b) $(6\sqrt{3}, 6)$ (c) $(6, 6)$ (d) $(6\sqrt{3}, 6\sqrt{3})$

(6) In the opposite figure :

X, Y are midpoints of $\overline{AB}$ and $\overline{AC}$, $\vec{AB} = \vec{M}$

, $\vec{AC} = \vec{N}$, then $\vec{XY} = \dots\dots\dots$

- (a) $\vec{M} + \vec{N}$ (b) $\vec{M} - \vec{N}$
(c) $\frac{1}{2}(\vec{M} - \vec{N})$ (d) $\frac{-1}{2}(\vec{M} - \vec{N})$



3 Choose the correct answer from those given :

(1) If $\begin{pmatrix} 4 & 1 \\ x & 1 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ -3 & 4 \end{pmatrix} = I$, then $x = \dots\dots\dots$

- (a) 3 (b) -3 (c) zero (d) 4

(2) At solving system of equations : $x + 2y - 3z = 6$, $2x - y - 4z = 2$ and $4x + 3y - 2z = 14$ by cramer's rule, then $\Delta_z = \dots\dots\dots$

- (a) -40 (b) -80 (c) zero (d) 2

(3) If the area of the convex quadrilateral whose diagonal lengths are 16 cm. and x cm. equals $24\sqrt{3} \text{ cm}^2$ and the measure of the included angle between them is 120° then $x = \dots\dots\dots \text{cm}$.

- (a) 4 (b) 6 (c) 8 (d) 10

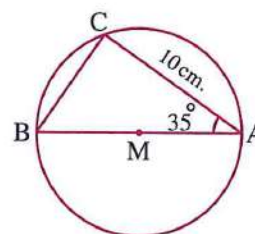
(4) In the opposite figure :

$\overline{AB}$ is a diameter in the circle M

, $AC = 10 \text{ cm}$. and $m(\angle A) = 35^\circ$

, then the length of the radius $\approx \dots\dots\dots \text{cm}$.

- (a) 3.4 (b) 6.1 (c) 6.9 (d) 8



(5) The general solution of the equation : $\tan \theta = \frac{1}{\sqrt{3}} = \dots\dots\dots$ (where $n \in \mathbb{Z}$)

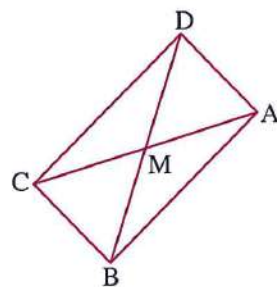
- (a) $\frac{\pi}{6} + n\pi$ (b) $2n\pi \pm \frac{\pi}{6}$ (c) $\frac{\pi}{3} + n\pi$ (d) $2n\pi \pm \frac{\pi}{3}$

(6) In the opposite figure :

ABCD is a parallelogram

, then $\overrightarrow{BM} + \overrightarrow{DA} = \dots\dots\dots$

- (a) $\overrightarrow{MD}$ (b) $\overrightarrow{MA}$
(c) $\overrightarrow{MB}$ (d) $\overrightarrow{MC}$



4 Choose the correct answer from those given :

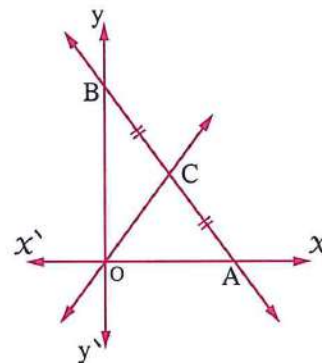
(1) In the opposite figure :

C is the midpoint of $\overline{AB}$

, the equation of $\overleftrightarrow{AB}$ is $\frac{x}{6} + \frac{y}{8} = 1$

, then the equation of $\overleftrightarrow{OC}$ is $\dots\dots\dots$

- (a) $y = \frac{3}{4}x$ (b) $y = \frac{4}{3}x$
(c) $y = \frac{3}{5}x$ (d) $y = \frac{5}{3}x$



(2) The vector equation of the straight line passes through the point $(2, -3)$ and is perpendicular to the vector $(-1, 2)$ is $\dots\dots\dots$

- (a) $\vec{r} = (2, -3) + k(-1, 2)$ (b) $\vec{r} = (-3, 2) + k(0, 1)$
(c) $\vec{r} = (2, -3) + k(2, 1)$ (d) $\vec{r} = (-1, 2) + k(-3, -2)$

(3) The measure of the acute angle between the two straight lines :

$x - 3y = -1$, $x + 2y = -3$ is $\dots\dots\dots^\circ$

- (a) 60 (b) 50 (c) 40 (d) 45

(4) If the length of the perpendicular drawn from the point $(3, 1)$ to the straight line $3x - 4y + c = 0$ equals 2 length units , then $c = \dots\dots\dots$

- (a) 5 or -15 (b) 3 or 7 (c) 10 or 15 (d) -8 or 8

(5) The area of circular segment in which the length of its arc equals 22 cm. and the length of the radius of its circle equals 14 cm. $\approx \dots\dots\dots \text{cm}^2$

- (a) 76 (b) 66 (c) 56 (d) 46

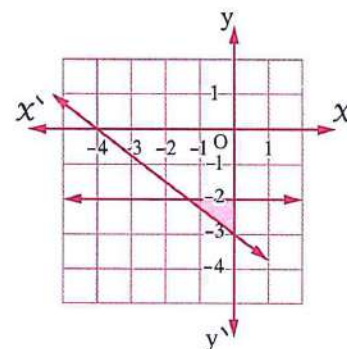
(6) If $\begin{vmatrix} k & 2 \\ 4 & k \end{vmatrix} = \begin{vmatrix} \sin \theta & -\cos \theta \\ \cos \theta & \sin \theta \end{vmatrix}$, then $k = \dots\dots\dots$

- (a) -3 (b) 3 (c) ± 3 (d) 9

- (7) The shaded area in the opposite figure represents the solution set of :

$x \leq 0$, $y \leq -2$ and

- (a) $3x + 4y + 12 \geq 0$
 (b) $3x + 4y + 12 \leq 0$
 (c) $4x + 3y - 9 \geq 0$
 (d) $x - 2y + 9 \leq 0$



- 5 ABCD is a trapezium in which $\overline{AD} \parallel \overline{BC}$, $\frac{BC}{AD} = \frac{3}{2}$, prove that : $\overrightarrow{AC} + \overrightarrow{BD} = \frac{5}{2} \overrightarrow{AD}$

- 6 Represent graphically the following system :

$x \geq 1$, $y \geq 1$, $x + y \leq 5$, then find the point that satisfies the objective function $P = 5x + 4y$ is as great as possible.

10

Suez Governorate



Mathematics Supervision

- 1 Choose the correct answer from those given :

- (1) If the matrix X is of order 3×2 , then the number of its elements =

- (a) 5 (b) 3 (c) 6 (d) 2

- (2) If A is a symmetric matrix , then $\frac{1}{2} (A + A^t) = \dots\dots\dots$

- (a) A (b) $\frac{1}{2} A$ (c) I (d) 0

- (3) If A is a matrix of order 2×3 , B^t is a matrix of order 1×3 , then AB is of order

- (a) 3×1 (b) 2×1 (c) 3×2 (d) 1×3

- (4) If $\begin{vmatrix} k-1 & 2 \\ 3 & k+1 \end{vmatrix} = 2$, then k =

- (a) ± 2 (b) ± 3 (c) ± 1 (d) ± 4

- (5) The matrix $\begin{pmatrix} a & 2 \\ 3 & 2 \end{pmatrix}$ has a multiplicative inverse , when

- (a) $a = 3$ (b) $a = \pm 3$ (c) $a \neq 3$ (d) $a \neq \pm 3$

- (6) If (1 , y) belongs to the region of solution of the inequality : $x + y < 7$, then

- (a) $y < 6$ (b) $y > 6$ (c) $y = 6$ (d) $y \neq 6$

- (7) If $A = \begin{pmatrix} 2 & -1 \\ 4 & -2 \end{pmatrix}$, then $A^2 = \dots\dots\dots$

- (a) $\begin{pmatrix} 2 & -1 \\ 4 & -2 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & 4 \\ -1 & -2 \end{pmatrix}$ (c) $I_{2 \times 2}$ (d) $O_{2 \times 2}$

2 Choose the correct answer from those given :

(1) If $A = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$, $B = (2 \ 3)$, then $AB = \dots\dots\dots$

- (a) (-4) (b) (4) (c) $\begin{pmatrix} 2 & 3 \\ -4 & -6 \end{pmatrix}$ (d) $\begin{pmatrix} 2 & -4 \\ 3 & -6 \end{pmatrix}$

(2) The length of the perpendicular drawn from the point $(3, 1)$ to the straight line $4x + 3y - 5 = 0$ equals $\dots\dots\dots$ length unit.

- (a) 3 (b) 2 (c) 4 (d) 5

(3) The coordinates of the point C which divides $\overline{AB}$ internally in the ratio 1 : 2, where $A(5, -6)$, $B(-1, 3)$ is $\dots\dots\dots$

- (a) $(-3, 3)$ (b) $(3, -3)$ (c) $(-3, -3)$ (d) $(3, 3)$

(4) The measure of the acute angle between the two straight lines whose equations are : $\sqrt{3}x - y = 4$, $y = 3$ is $\dots\dots\dots$

- (a) 30° (b) 45° (c) 60° (d) 90°

(5) If the two straight lines : $2x + ay + 3 = 0$, $\vec{r} = (2, -1) + k(1, 3)$ are perpendicular, then $a = \dots\dots\dots$

- (a) 6 (b) -6 (c) 1 (d) -1

(6) The straight line whose equation : $\vec{r} = (-1, 3) + k(2, 4)$ passes through the point $\dots\dots\dots$

- (a) $(2, 5)$ (b) $(-3, -1)$ (c) $(0, 2)$ (d) $(1, 4)$

3 Choose the correct answer from those given :

(1) The vector equation of the straight line which passes through the point $(2, 3)$ and parallel to y-axis is $\dots\dots\dots$

- (a) $\vec{r} = (2, 3) + k(0, 1)$ (b) $\vec{r} = (2, 3) + k(1, 0)$
(c) $\vec{r} = k(2, 3)$ (d) $\vec{r} = k(1, 0)$

(2) The slope of the straight line whose parametric equations are : $x = -4 + 2k$ and $y = 1 + 10k$ is $\dots\dots\dots$

- (a) 5 (b) -5 (c) 4 (d) -4

(3) The two vectors $\vec{A} = (3, m)$ and $\vec{B} = -9\mathbf{i} + 12\mathbf{j}$, are parallel, then $m = \dots\dots\dots$

- (a) 4 (b) -4 (c) 6 (d) -6

(4) If the vector $\vec{A} = -12\mathbf{i} + 12\mathbf{j}$, then the polar form of $\vec{A} = \dots\dots\dots$

- (a) $(12\sqrt{2}, \frac{3\pi}{4})$ (b) $(12, \frac{\pi}{4})$ (c) $(12\sqrt{2}, \frac{\pi}{4})$ (d) $(12\sqrt{2}, \frac{5\pi}{4})$

(5) If $\|6k\vec{A}\| = \|-18\vec{A}\|$, then

- (a) $k = 3$ (b) $k = -3$ (c) $k = \pm 3$ (d) $k \neq 3$

(6) ABCD is a parallelogram its diagonals intersect at M, then $\vec{MD}$ equivalent to

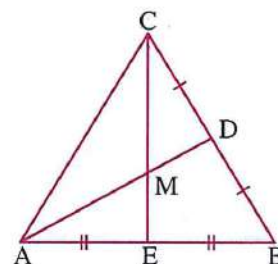
- (a) $\vec{MB}$ (b) $\frac{1}{2}\vec{DB}$ (c) $\vec{BM}$ (d) $\vec{MA}$

4 Choose the correct answer from those given :

(1) In the opposite figure :

$$\vec{AB} + \vec{AC} = \dots\dots\dots \vec{AM}$$

- (a) 2 (b) 4
(c) 3 (d) 6



(2) The expression : $5 \tan^2 \theta - 5 \sec^2 \theta = \dots\dots\dots$

- (a) 5 (b) -5 (c) $\frac{1}{5}$ (d) 1

(3) A light pole of length 7.2 meters its shadow on the ground is of length 4.8 meters, then the measure of the elevation angle of the sun to the nearest degree =

- (a) 32 (b) 56 (c) 51 (d) 58

(4) The area of circular sector is 270 cm^2 and the radius length of its circle is 15 cm. , then the measure of its angle is^{rad}

- (a) 2 (b) 2.4 (c) 4.2 (d) 1.5

(5) The area of the circular segment whose arc length is $6\pi \text{ cm}$. and its radius length is 24 cm. equals approximately cm^2 .

- (a) 41 (b) 29 (c) 23 (d) 37

(6) The quadrilateral whose diagonal lengths are 10 cm. , 12 cm. and the measure of the included angle between its diagonals is 62° , then its area $\approx$ cm^2 .

- (a) 43 (b) 52.98 (c) 30.9 (d) 40

5 Represent graphically the S.S. in $\mathbb{R} \times \mathbb{R}$:

$$x \geq 0, y \geq 0, 2x + y \leq 6, x + y \leq 4$$

6 ABCD is a quadrilateral in which :

$$\vec{BC} = 3\vec{AD}, \text{ prove that : } \vec{AC} + \vec{BD} = 4\vec{AD}$$



1 Choose the correct answer from those given :

(1) The point that lies in the solution set of : $3x + 2y \leq 6$ is

- (a) (2 , 3) (b) (3 , 4) (c) (1 , 1) (d) (5 , - 1)

(2) $\sin^2 \theta + \cos^2 \theta + \cot^2 \theta = \dots\dots\dots$

- (a) 1 (b) $\cot^2 \theta$ (c) $\sec^2 \theta$ (d) $\csc^2 \theta$

(3) If $\vec{A} = (6 , 2)$, $\vec{B} = (3 , k)$, then $\vec{A} \parallel \vec{B}$ when $k = \dots\dots\dots$

- (a) 1 (b) 2 (c) 0.4 (d) 2.5

(4) If the matrix $\begin{pmatrix} 0 & x-1 \\ x^2-1 & 0 \end{pmatrix}$ is a skew symmetric , then $x \in \dots\dots\dots$

- (a) $\{-1 , 2\}$ (b) $\{0 , -1\}$ (c) $\{1 , -2\}$ (d) $\{0 , 1\}$

(5) If $\begin{pmatrix} x-1 & 5 \\ 8 & 2 \end{pmatrix} = \begin{pmatrix} 6 & 5 \\ 2y & 2 \end{pmatrix}$, then $x - y = \dots\dots\dots$

- (a) 2 (b) 3 (c) - 2 (d) 1

(6) An equilateral triangle with area $9\sqrt{3} \text{ cm}^2$, then its side length is cm.

- (a) 4 (b) 16 (c) 36 (d) 6

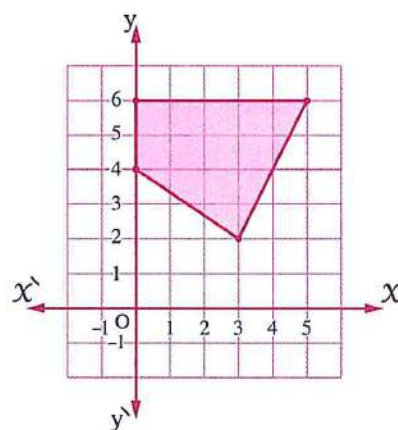
2 Choose the correct answer from those given :

(1) From the opposite figure the point

that makes the objective function

$P = 3x + 2y$ as small as possible is

- (a) (0 , 4) (b) (3 , 2)
(c) (5 , 6) (d) (0 , 6)



(2) A circular sector of area 120 cm^2 and its arc of length 20 cm.

, then its perimeter = cm.

- (a) 60 (b) 44 (c) 40 (d) 50

(3) If $\|6k\vec{A}\| = \|-18\vec{A}\|$, then $k = \dots\dots\dots$

- (a) 3 (b) - 3 (c) ± 18 (d) ± 3

(4) The polar form of $\vec{A}$, if $\vec{A} = -9\vec{i}$ is

- (a) $(-9 , 2\pi)$ (b) $(9 , 2\pi)$ (c) $(-9 , \pi)$ (d) $(9 , \pi)$

(5) In $\triangle ABC$, D is the midpoint of $\overline{BC}$, then $\overrightarrow{BA} + \overrightarrow{CA} + \overrightarrow{AD} = \dots\dots\dots$

- (a) $\overrightarrow{BC}$ (b) $\overrightarrow{DA}$ (c) $2\overrightarrow{DA}$ (d) $\overrightarrow{CB}$

(6) If $90^\circ \leq \theta \leq 180^\circ$, $2 \sin \theta - 1 = 0$, then $\theta = \dots\dots\dots$

- (a) 120° (b) 150° (c) 240° (d) 30°

3 Choose the correct answer from those given :

(1) If $A = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$, then $A^2 = \dots\dots\dots$

- (a) $\begin{pmatrix} 4 & 0 \\ 1 & 4 \end{pmatrix}$ (b) $2I$ (c) $4I$ (d) O

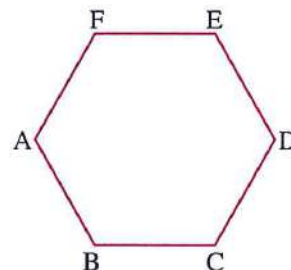
(2) If $\begin{pmatrix} 2 & 1 \\ 3 & -1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 9 \\ 6 \end{pmatrix}$, then $a + b = \dots\dots\dots$

- (a) 3 (b) 4 (c) 5 (d) 6

(3) If ABCDEF is a regular hexagon :

$\overrightarrow{AB} - \overrightarrow{CB} + \overrightarrow{CD} + \overrightarrow{DE} + \overrightarrow{EF} = \dots\dots\dots$

- (a) $\overrightarrow{FE}$ (b) $\overrightarrow{AF}$
(c) $\overrightarrow{AD}$ (d) $\overrightarrow{AC}$



(4) In $\triangle ABC$, where A (1, 2), B (3, 5), C (-1, 2), then the intersection of its medians is $\dots\dots\dots$

- (a) (1, 2) (b) (1, 3) (c) (3, 9) (d) (3, 1)

(5) The vector form of the equation of a line passes origin point and (-2, 3) is $\dots\dots\dots$

- (a) $\vec{r} = k(-2, 3)$ (b) $\vec{r} = k(3, -2)$
(c) $\vec{r} = (-2, 3) + k(1, 0)$ (d) $\vec{r} = (-2, 3) + k(0, 1)$

(6) The area of the triangle bounded by the two axes and the straight line :

$x + 3y - 6 = 0$ is $\dots\dots\dots$ square units.

- (a) 6 (b) 3 (c) 2 (d) 12

4 Choose the correct answer from those given :

(1) The equation of the straight line passes through (2, 0) and parallel to the line $2x - y = 5$ is $\dots\dots\dots$

- (a) $2x - y + 1 = 0$ (b) $y - 2x - 4 = 0$ (c) $y - 2x + 4 = 0$ (d) $y + x = 4$

(2) From a point of a distance 30 metres from the base of a tower, the elevation angle of the top of the tower was 70° , then the height of the tower is $\dots\dots\dots$ to the nearest metres.

- (a) 79 (b) 80 (c) 81 (d) 82

- (3) The length of the perpendicular drawn from A (-2, -4) to the X-axis is length.
 (a) 2 (b) -2 (c) 4 (d) -4
- (4) The area of circular segment equals the area of circular sector which drawn in the same arc, if the measure of its central angle =
 (a) 90° (b) 180° (c) 270° (d) 45°
- (5) The length of perpendicular drawn from A (1, a) to the line : $3x - 4y + 17 = 0$ is 3.2 unit length, then one of the values of a =
 (a) 2 (b) -2 (c) 1 (d) -1
- (6) If $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = 5$, $d - c = 7$, then $\begin{vmatrix} a+2 & b+2 \\ c & d \end{vmatrix} = \dots\dots\dots$
 (a) 49 (b) 19 (c) 14 (d) 35
- (7) When solving the system : $2x + y = 7$, $3x - y = 3$, then $\Delta_x = \dots\dots\dots$
 (a) -10 (b) -5 (c) -15 (d) 10

5 Represent each of the following systems graphically :

$x \geq 2$, $y \geq 1$, $x + y \leq 4$, then find the maximum value to the objective function according to the given $P = 2x + 3y$

6 Find the different forms of the equation of the straight line which passes through the point (2, -3) and (5, 1)

12

El-Beheira Governorate



**Dalangate Educational Administration
Maths Supervision**

1 Choose the correct answer from those given :

(1) If A is a matrix on the system 3×2 where $A_{y_h} = y + h$, then A =

- (a) $\begin{vmatrix} 0 & -1 \\ 1 & 0 \\ 2 & 1 \end{vmatrix}$ (b) $\begin{vmatrix} 0 & 1 \\ -1 & 0 \\ 2 & -1 \end{vmatrix}$ (c) $\begin{vmatrix} 2 & 3 \\ 3 & 4 \\ 4 & 5 \end{vmatrix}$ (d) $\begin{vmatrix} 0 & -1 \\ -1 & 0 \\ -2 & -1 \end{vmatrix}$

(2) The general solution to the equation : $\tan x - \sqrt{3} = 0$ is ($n \in \mathbb{Z}$)

- (a) $\pm \frac{\pi}{3} + 2\pi n$ (b) $\pm \frac{\pi}{6} + 2\pi n$ (c) $\pm \pi + \pi n$ (d) $\frac{\pi}{3} + \pi n$

(3) The value of the determinant $\begin{vmatrix} 2 & 2 & -2 \\ 0 & -1 & 4 \\ 0 & 0 & 1 \end{vmatrix} = \dots\dots\dots$

- (a) 1 (b) 2 (c) -2 (d) 4

- (4) Polar form of position vector $\overrightarrow{WA}$ where $\overrightarrow{WA} = (3, 3\sqrt{3})$ is
- (a) $(6, \frac{\pi}{3})$ (b) $(6, \frac{\pi}{6})$ (c) $(3, \frac{\pi}{3})$ (d) $(3, \frac{\pi}{6})$
- (5) A kite has a string length of 50 meters, if the angle made by the string with the horizontal is 50° , then the height of the kite above the ground = to the nearest meter.
- (a) 32 (b) 65 (c) 37 (d) 38
- (6) The vector that represents the displacement of a body 100 cm. in the south east direction in terms of the two fundamental unit vectors is
- (a) $50\sqrt{2}\vec{i} + 50\sqrt{2}\vec{j}$ (b) $-50\sqrt{2}\vec{i} + 50\sqrt{2}\vec{j}$
 (c) $-50\sqrt{2}\vec{i} - 50\sqrt{2}\vec{j}$ (d) $50\sqrt{2}\vec{i} - 50\sqrt{2}\vec{j}$

2 Choose the correct answer from those given :

- (1) If A is a matrix of order 3×2 and B is a matrix of order 2×3 , then AB is a matrix of order
- (a) 3×3 (b) 3×1 (c) 1×3 (d) 1×2
- (2) $\sin^2 \theta - \sin^4 \theta + \cos^4 \theta = \dots\dots\dots$
- (a) $\tan^2 \theta$ (b) 1 (c) $\cos^2 \theta$ (d) $\sin^2 \theta$
- (3) When solving the two equations : $a_1 x + b_1 y = 4$ and $a_2 x + b_2 y = -1$ it was found that the multiplicative inverse of the matrix $\begin{pmatrix} a_1 & b_1 \\ a_2 & b_2 \end{pmatrix}$ is $\begin{pmatrix} 1 & 3 \\ 1 & 1 \end{pmatrix}$ so $(x, y) \dots\dots\dots$
- (a) (1, 3) (b) (3, 1) (c) (7, -1) (d) (6, -7)
- (4) If $\vec{A} = (m, 1)$, $\vec{B} = (16, 2)$ and $\vec{A} \parallel \vec{B}$ so $m = \dots\dots\dots$
- (a) 8 (b) 4 (c) $(\frac{1}{4})$ (d) -8
- (5) If the surface area of a circular sector is 110 cm^2 and the measure of its angle is 2.2^{rad} , then the length of its diameter = cm.
- (a) 55 (b) 5 (c) 10 (d) 20
- (6) If $2\vec{m} + \vec{AB} = 2\vec{CB} - \vec{AB}$, then $\vec{m} = \dots\dots\dots$
- (a) $\vec{AC}$ (b) $\vec{CA}$ (c) $\vec{BC}$ (d) $2\vec{BA}$

3 Choose the correct answer from those given :

- (1) The ratio in which the X-axis divides the directed line segment $\overrightarrow{AB}$ where $A = (-4, 3)$ and $B = (8, 6)$ is
- (a) 1 : 2 externally. (b) 1 : 2 internally.
 (c) 2 : 1 internally. (d) 2 : 1 externally.

(2) If $\begin{vmatrix} a & b & c \\ d & h & w \\ x & y & r \end{vmatrix} = 10$, then $\begin{vmatrix} r & x & y \\ w & d & h \\ c & a & b \end{vmatrix} = \dots\dots\dots$

- (a) 10 (b) -10 (c) -5 (d) 5

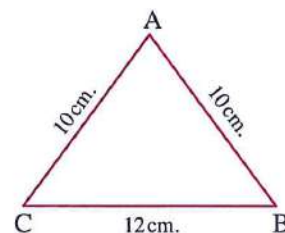
(3) The area of a circular segment with a radius of 14 cm. and an arc length of 22 = cm^2 .

- (a) 50 (b) 55 (c) 57 (d) 56

(4) In the opposite figure :

The surface area of $\Delta ABC = \dots\dots\dots \text{cm}^2$

- (a) 48 (b) 50
(c) 60 (d) 120



(5) If $X = \begin{pmatrix} 3 & 4 \\ 5 & 2 \end{pmatrix}$, $Y = \begin{pmatrix} 1 & 1 \\ 0 & -1 \end{pmatrix}$, then $X - Y - 2I = \dots\dots\dots$

- (a) $\begin{pmatrix} 0 & 3 \\ 5 & 1 \end{pmatrix}$ (b) $\begin{pmatrix} 6 & 5 \\ 5 & 5 \end{pmatrix}$ (c) $\begin{pmatrix} 6 & 5 \\ 5 & 3 \end{pmatrix}$ (d) $20 \begin{pmatrix} 4 & 5 \\ 3 & 5 \end{pmatrix}$

(6) If $\vec{A} = (3, -2)$, $\vec{B} = (-2, 5)$, $\vec{C} = (0, 11)$, then vector $\vec{C}$ in terms of vector $\vec{A}$, $\vec{B} = \dots\dots\dots$

- (a) $\vec{C} = 2\vec{A} + 3\vec{B}$ (b) $\vec{C} = 3\vec{A} + 2\vec{B}$ (c) $\vec{C} = 3\vec{A} - 2\vec{B}$ (d) $\vec{C} = 2\vec{A} - 3\vec{B}$

4 Choose the correct answer from those given :

(1) The vector equation of the line passing through point $(1, -1)$ and parallel to line $2x - 3y = 10$ is

- (a) $\vec{r} = (1, -1) + k(3, 2)$ (b) $\vec{r} = (1, -1) + k(2, 3)$
(c) $\vec{r} = (1, -1) + k(-3, 2)$ (d) $\vec{r} = (1, -1) + k(-2, 3)$

(2) Measure of the acute angle between the two straight lines : $\sqrt{3}x - y = 4$, $x = 3$ equal $^\circ$

- (a) 30 (b) 45 (c) 60 (d) 90

(3) The length of the perpendicular line drawn from the point $(0, -5)$ to the line $\vec{r} = (-1, 0) + n(12, 5)$ equals unit of length.

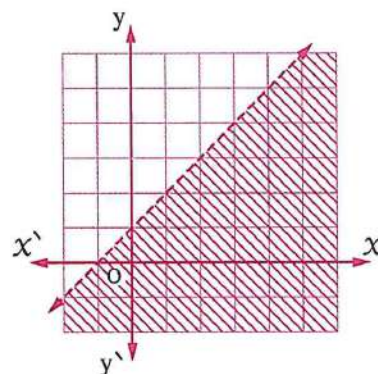
- (a) 4 (b) 12 (c) 13 (d) 5

(4) If $X = \begin{pmatrix} 1 & 7 \\ 0 & -1 \end{pmatrix}$, then $X^{-1} = \dots\dots\dots$

- (a) I (b) X (c) $2X$ (d) 0

- (5) The opposite shaded region represents the solution set of the inequality in $\mathbb{R} \times \mathbb{R}$

- (a) $x + 1 \leq y$
 (b) $x + 1 < y$
 (c) $x - y \geq -1$
 (d) $x - y > -1$



- (6) If the line $2x + 3y = 6$ intersects the x -axis and y -axis at point A and B, respectively, then the area of $\triangle OAB$, where O is the origin = square units.
 (a) 6 (b) 5 (c) 3 (d) 12
- (7) The length of the perpendicular drawn from the point $(-5, 3)$ on the y -axis is equal to units of length.
 (a) 5 (b) -5 (c) 3 (d) -3

5 ABCD is a quadrilateral, if $\overrightarrow{BC} = 4 \overrightarrow{AD}$, prove that : $\overrightarrow{AC} + \overrightarrow{BD} = 5 \overrightarrow{AD}$

6 Find the point that satisfies the objective function : $\mathbb{R} = 3x + 4y$ as great as possible under the constraints : $x \geq 0, y \geq 0, x + y \leq 5, x + 2y \leq 6$

13 El-Menia Governorate



Math Department

1 Choose the correct answer from those given :

(1) If $\begin{vmatrix} 2x & 2 \\ 4 & 3 \end{vmatrix} = 10$, then $x = \dots\dots\dots$

- (a) 2 (b) 3 (c) 4 (d) 5

(2) If A and B are two square matrices from the same order and $AB = B^{-1}$, then $A^{-1} = \dots\dots\dots$

- (a) AB (b) BA (c) A^2 (d) B^2

(3) If A is a square matrix of order 2×2 and $|2A| = 8$, then $|3A| = \dots\dots\dots$

- (a) 9 (b) 12 (c) 18 (d) 24

(4) If $\begin{vmatrix} x & 12 \\ 3 & x \end{vmatrix} = \begin{vmatrix} 2 & 1 \\ 10 & 5 \end{vmatrix}$, then $x = \dots\dots\dots$

- (a) 2 (b) 5 (c) 6 (d) ± 6

(5) $\begin{pmatrix} x \\ 6 \end{pmatrix} - \begin{pmatrix} 1 \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$, then $x + y = \dots\dots\dots$

- (a) 5 (b) 4 (c) 3 (d) 1

(6) If A is a matrix, then $(A + A^t)$ is matrix.

- (a) symmetric (b) skew symmetric (c) zero (d) diagonal

(7) If $X = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$, $Y = (-2 \ 5)$, then $YX = \dots\dots\dots$

- (a) $\begin{pmatrix} -9 \\ 3 \end{pmatrix}$ (b) $(-9 \ 10)$ (c) $\begin{pmatrix} -9 & 15 \\ 3 & 10 \end{pmatrix}$ (d) (11)

2 Choose the correct answer from those given :

(1) If $0^\circ \leq \theta < 180^\circ$, $\cot \theta = 1$, then $\theta = \dots\dots\dots^\circ$

- (a) 30 (b) 45 (c) 60 (d) 135

(2) In $\triangle ABC$ which is right angled triangle at B , $m(\angle C) = 54^\circ 13'$, $BC = 20$ cm., then the length of AB equals

- (a) 16.2 (b) 11.7 (c) 14.4 (d) 27.7

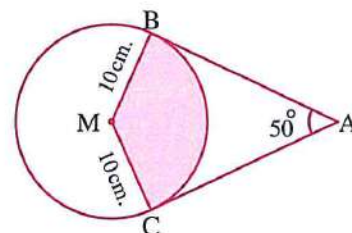
(3) The length of the thread of a kite is 42 meter, if the measure of the angle which the thread makes with the horizontal ground = 63° , then the height of the kite from the surface of the ground $\approx \dots\dots\dots$ m.

- (a) 37 (b) 19 (c) 82 (d) 80

(4) In the opposite figure :

The area of the shaded part = cm^2

- (a) $\frac{50}{9} \pi$ (b) $\frac{125}{9} \pi$
(c) $\frac{200}{9} \pi$ (d) $\frac{325}{9} \pi$



(5) $\sin^2 \theta + \cos^2 \theta + \tan^2 \theta = \dots\dots\dots$

- (a) 1 (b) $\cot^2 \theta$ (c) $\csc^2 \theta$ (d) $\sec^2 \theta$

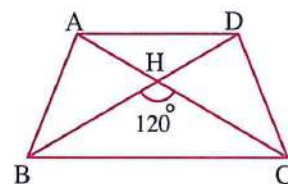
(6) In the opposite figure :

$ABCD$ is a quadrilateral in which $BD = 6$ cm.

and the area of $ABCD = 24\sqrt{3} \text{ cm}^2$, $m(\angle BHC) = 120^\circ$

, then $AC = \dots\dots\dots$ cm.

- (a) 12 (b) 14 (c) 15 (d) 16



3 Choose the correct answer from those given :

(1) If $\overrightarrow{AB} = \overrightarrow{AC}$, then

- (a) B midpoint of $\overline{AC}$ (b) C midpoint of $\overline{AB}$
(c) B coincident on C (d) A coincident on C

(2) If $\|k(3, 4)\| = 1$, then $k = \dots\dots\dots$

- (a) $\frac{1}{7}$ (b) $\frac{1}{25}$ (c) $\pm \frac{1}{5}$ (d) ± 5

- (3) If $\vec{A} = (-4, 2)$, $\vec{B} = (3, -5)$, then $\vec{A} + 2\vec{B} = \dots\dots\dots$
 (a) $(-2, 8)$ (b) $(8, 2)$ (c) $(2, -8)$ (d) $(2, 8)$
- (4) If $\vec{A} = (3, 4)$, $\vec{B} = (k, -8)$ and if $\vec{A} \parallel \vec{B}$, then $k = \dots\dots\dots$
 (a) -6 (b) 3 (c) 4 (d) -15
- (5) If $\vec{A} = (3, 6)$, $\vec{B} = (x-5, 10)$ and $\vec{A} \perp \vec{B}$, then $x = \dots\dots\dots$
 (a) 20 (b) -18 (c) -16 (d) -15
- (6) Which of the following points belongs to the solution set of :
 $2x + y < 4$, $x + 3y < 6$?
 (a) $(1, -4)$ (b) $(2, 1)$ (c) $(1, 2)$ (d) $(3, -1)$

4 Choose the correct answer from those given :

- (1) Circle its center $(2, -2)$ and one of end points of the diameter is $(4, 2)$, then the other end point is
 (a) $(-4, 2)$ (b) $(0, -6)$ (c) $(-3, -3)$ (d) $(8, 4)$
- (2) The area of a triangle bounded by x -axis, y -axis and the equation $3x + 8y - 24 = 0$ equals square unit.
 (a) 12 (b) 11 (c) 24 (d) 32
- (3) The vector equation of x -axis is
 (a) $\vec{r} = (1, 1) + k(0, 0)$ (b) $\vec{r} = (1, 0) + k(1, 1)$
 (c) $\vec{r} = k(1, 0)$ (d) $\vec{r} = k(0, 1)$
- (4) The measure of the angle between two straight lines their slopes $3, -\frac{1}{3}$ equals°
 (a) 45 (b) 90 (c) 30 (d) 60
- (5) The equation of the straight line L which passes through the point $(4, 1)$ and parallel to straight line $3x - y + 4 = 0$ is
 (a) $3x - y - 11 = 0$ (b) $2x + y + 12 = 0$
 (c) $x + y - 10 = 0$ (d) $y - x + 3 = 0$
- (6) The length of the perpendicular from the point $(0, -5)$ to the straight line : $x + 7 = 0$ equals unit length.
 (a) 2 (b) 5 (c) 7 (d) 12

5 ABCD is a parallelogram, if H is the midpoint of $\overline{BC}$, prove that :

$$\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{DC} = 2\overrightarrow{AH}$$

6 Represent the following system graphically :

$y \geq 0$, $x \geq 0$, $x + y \leq 3$, $2y + x \leq 4$, then find the point that makes the objective function $P = 3x + 4y$ as great as possible.



1 Choose the correct answer from those given :

- (1) If $A = \begin{pmatrix} 3 & -2 & 7 \\ 5 & -4 & 2 \end{pmatrix}$, $B = A^t$, then $a_{13} + b_{31} = \dots\dots\dots$
- (a) 4 (b) 9 (c) 14 (d) 10
- (2) If $\overrightarrow{AB} = (2, 6)$, $\overrightarrow{AC} = (-2, 9)$, then $\|\overrightarrow{BC}\| = \dots\dots\dots$
- (a) 15 (b) 13 (c) 4 (d) 5
- (3) If $A(2, 5)$, $B(7, -1)$, then the point C which divides $\overline{AB}$ externally in the ratio 3 : 2 is $\dots\dots\dots$
- (a) $(-25, -7)$ (b) $(25, 7)$ (c) $(17, 13)$ (d) $(17, -13)$
- (4) From the top of a rock 100 metres high, the depression angle of the boat which is 200 m. away from the base of the rock equals (in radian) $\approx \dots\dots\dots^{\text{rad}}$
- (a) 0.08 (b) 0.46 (c) 0.25 (d) 0.24
- (5) If $\begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} x & 7 \\ 3 & y \end{pmatrix} = \begin{pmatrix} 7 & 8 \\ 11 & 18 \end{pmatrix}$, then $x + y = \dots\dots\dots$
- (a) -3 (b) 3 (c) -2 (d) -1
- (6) The area of a circle is 706.5 cm^2 , find the area of a circular segment of this circle where the measure of its angle is 135° ($\pi = 3.14$) $\approx \dots\dots\dots \text{cm}^2$
- (a) 264.9 (b) 185.5 (c) 12.4 (d) 344.6
- (7) If $A = (3, 6)$, $B = (-7, 4)$, then the midpoint of $\overline{AB} = \dots\dots\dots$
- (a) $(-4, 10)$ (b) $(-4, 5)$ (c) $(5, 1)$ (d) $(-2, 5)$

2 Choose the correct answer from those given :

- (1) $\frac{1 - \cos^2 \beta}{\sin^2 \beta - 1}$ in the simplest form equals $\dots\dots\dots$
- (a) $-\tan^2 \beta$ (b) $-\cos^2 \beta$ (c) $\tan^2 \beta$ (d) $\cot^2 \beta$
- (2) If the two vectors $\vec{A} = (n, 1)$, $\vec{B} = n\vec{i} - 4\vec{j}$ are perpendicular, then $n = \dots\dots\dots$
- (a) 2 (b) -2 (c) ± 2 (d) -4
- (3) $\begin{pmatrix} 5 \\ -3 \end{pmatrix} + 3(1 \ -2)^t = \dots\dots\dots$
- (a) $\begin{pmatrix} 6 \\ -5 \end{pmatrix}$ (b) $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$ (c) $\begin{pmatrix} 8 \\ -9 \end{pmatrix}$ (d) $\begin{pmatrix} 1 & 0 \\ 4 & 1 \end{pmatrix}$

(4) The area of the triangle whose side lengths 4 cm. , 6 cm. , 8 cm. $\approx$ cm^2

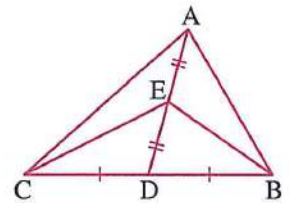
- (a) 173.9 (b) 11.6 (c) 13.9 (d) 41.6

(5) In the opposite figure :

ABC is a triangle , if D is the midpoint of $\overline{BC}$

, E is the midpoint of $\overline{AD}$

, then $\overrightarrow{AB} + \overrightarrow{AC} =$ $\overrightarrow{AE}$



- (a) 1 (b) 2
(c) 4 (d) 6

(6) If $A = \begin{pmatrix} 1 & 1 & x-1 \\ 1 & 3 & 5 \\ -1 & 5 & 6 \end{pmatrix}$ is a symmetric matrix , then $x =$

- (a) -1 (b) zero (c) 4 (d) 6

3 Choose the correct answer from those given :

(1) If $A = \begin{pmatrix} 1 & -3 \\ -1 & 2 \end{pmatrix}$, $(A+B)^t = \begin{pmatrix} 3 & -2 \\ 1 & -4 \end{pmatrix}$, then $B =$

- (a) $\begin{pmatrix} 2 & -1 \\ 4 & -6 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & 4 \\ -1 & -6 \end{pmatrix}$ (c) $\begin{pmatrix} 2 & 1 \\ 0 & -6 \end{pmatrix}$ (d) $\begin{pmatrix} 2 & 0 \\ 1 & -6 \end{pmatrix}$

(2) The area of the circular sector in which $r = 4$ cm. and its perimeter 20 cm. equals cm^2

- (a) 40 (b) 32 (c) 24 (d) 48

(3) If ABCDEF is a regular hexagon whose centre (M) which of the following directed line segments are not equivalent ?

- (a) $\overrightarrow{AB}$, $\overrightarrow{FM}$ (b) $\overrightarrow{AB}$, $\overrightarrow{ED}$ (c) $\overrightarrow{AB}$, $\overrightarrow{MC}$ (d) $\overrightarrow{AB}$, $\overrightarrow{MD}$

(4) If the slope of the straight line : $(3a+1)x - 2ay + 3 = 0$ equals 2 , then $a =$

- (a) 1 (b) -1 (c) $\frac{5}{3}$ (d) $-\frac{1}{2}$

(5) The solution set of the equation : $\begin{vmatrix} x & 0 & 0 \\ 5 & 3 & 0 \\ 4 & -1 & 2x \end{vmatrix} = 6$ is

- (a) $\{3\}$ (b) $\{6\}$ (c) $\{1, -1\}$ (d) $\{6, -6\}$

(6) In ΔABC : $A(3, 7)$, $B(7, -1)$, $C(3, 2)$, then the length of the perpendicular drawn from A to $\overleftrightarrow{BC}$ equals length units.

- (a) 3 (b) 4 (c) 5 (d) 1

4 Choose the correct answer from those given :

(1) If $\vec{B} = (-2, 4)$, $\vec{C} = (4, 3)$ and $2\vec{A} - 3\vec{B} = 4\vec{C}$, then $\|\vec{A}\| = \dots\dots\dots$

- (a) 5 (b) 12 (c) 13 (d) 7

(2) If $\vec{u} = (2, -5)$ is a direction vector of a straight line, then all of the following vectors are direction vectors to the same straight line except the vector $\dots\dots\dots$

- (a) $(-2, 5)$ (b) $(6, -15)$ (c) $(2, 5)$ (d) $(-1, 2.5)$

(3) The solution set of the equation : $\sin \theta + \cos \theta = 0$, where $180^\circ < \theta < 360^\circ$ is $\dots\dots\dots$

- (a) $\{210^\circ\}$ (b) $\{225^\circ\}$ (c) $\{240^\circ\}$ (d) $\{315^\circ\}$

(4) The point which does not belong to the solution set of the inequalities :

$x \geq 2$, $y \geq 0$, $x + y > 3$ is $\dots\dots\dots$

- (a) $(3, 1)$ (b) $(2, 2)$ (c) $(3, 2)$ (d) $(2, 1)$

(5) When the two equations : $ax + by = 5$, $cx + dy = -1$ have been solved, it found

that the multiplicative inverse of the matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is $\begin{pmatrix} 3 & 2 \\ -3 & 1 \end{pmatrix}$, then $x + y = \dots\dots\dots$

- (a) 3 (b) zero (c) 9 (d) -3

(6) The measure of the angle between the two straight lines :

$L_1 : x + 2y + 5 = 0$, $L_2 : \vec{r} = (1, 4) + k(1, 2)$ equals $\dots\dots\dots$

- (a) 0° (b) 45° (c) 90° (d) 135°

5 Find the general equation of the straight line which :

Passes through the point $(3, -5)$ and is perpendicular to the straight line $x + 3y = 1$

6 Represent the following system graphically, then find the point that satisfies the objective function :

$x \geq 0$, $y \geq 0$, $y + 2x \leq 10$, $x + 4y \leq 12$, the objective function $P = 2y + 5x$ is as great as possible.

15

Aswan Governorate



Maths Inspection

1 Choose the correct answer from those given :

(1) If $\begin{pmatrix} 1 & x & 2 \\ -1 & 6 & 5 \end{pmatrix}^t = \begin{pmatrix} 1 & -1 \\ -3 & 6 \\ 2 & y \end{pmatrix}$, then $xy = \dots\dots\dots$

- (a) 2 (b) 15 (c) -15 (d) -2

- (2) If A is a diagonal matrix of order 3×3 and $a_{xy} = 5$ for every $x = y$, then =
- (a) $A = I$ (b) $A = 5I$ (c) $A = 5O$ (d) $A = O$
- (3) If $C = \begin{pmatrix} a & 4 \\ 5 & 2 \end{pmatrix}$ has no multiplicative inverse, then $a = \dots$
- (a) 4 (b) 5 (c) 10 (d) 20
- (4) If the matrix $A = \begin{pmatrix} 1 & 2x-4 \\ -2 & 3 \end{pmatrix}$ is symmetric, then $x = \dots$
- (a) 1 (b) 3 (c) 2 (d) -2
- (5) $\begin{pmatrix} -5 & -2 \\ 4 & 7 \end{pmatrix} + \begin{pmatrix} 6 & -4 \\ 2 & -6 \end{pmatrix}^t = \dots$
- (a) O (b) $\begin{pmatrix} 1 & -4 \\ 0 & 1 \end{pmatrix}$ (c) $\begin{pmatrix} 11 & 0 \\ 0 & 1 \end{pmatrix}$ (d) I
- (6) If $\begin{vmatrix} 2x & 2 \\ 4 & 3 \end{vmatrix} = 10$, then $x = \dots$
- (a) 3 (b) -3 (c) 4 (d) -4

2 Choose the correct answer from those given :

- (1) If $X = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$, $Y = \begin{pmatrix} -3 & 5 \end{pmatrix}$, then $YX = \dots$
- (a) $\begin{pmatrix} -9 \\ 10 \end{pmatrix}$ (b) $\begin{pmatrix} -9 & 10 \end{pmatrix}$ (c) $\begin{pmatrix} -9 & 15 \\ -6 & 10 \end{pmatrix}$ (d) (1)
- (2) The region representing the S.S. of the inequalities :
 $y > 0$, $x < 0$ in $\mathbb{R} \times \mathbb{R}$ is the quadrant.
- (a) first (b) second (c) third (d) fourth
- (3) $\tan \theta \csc \theta = \dots$
- (a) 1 (b) $\cos \theta$ (c) $\sec \theta$ (d) $\csc \theta$
- (4) $5 \cos^2 30^\circ + 5 \sin^2 30^\circ = \dots$
- (a) 1 (b) 5 (c) 10 (d) 25
- (5) A man found that the measure of the angle of elevation of the top of a house at a point 50 metres far from its base is $38^\circ 26'$, then the height of the house to the nearest metre is m.
- (a) 40 (b) 90 (c) 100 (d) 120

(6) The area of the circular sector in which the radius length of its circle is 4 cm. and the length of its arc is 7 cm. equals cm^2

- (a) 11 (b) 14 (c) 28 (d) 30

3 Choose the correct answer from those given :

(1) The general solution of the equation : $\sqrt{3} \tan \theta - 1 = 0$ is (where $n \in \mathbb{Z}$)

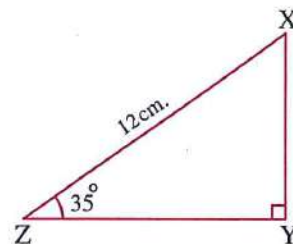
- (a) $\frac{\pi}{6} + n\pi$ (b) $2n\pi + \frac{\pi}{6}$ (c) $\frac{\pi}{3} + n\pi$ (d) $2n\pi \pm \frac{\pi}{3}$

(2) In the opposite figure :

$XZ = 12 \text{ cm.}$, $m(\angle Z) = 35^\circ$

, then $XY \approx$ cm.

- (a) 9.8 (b) 6.9
(c) 8.4 (d) 14.6



(3) If $\vec{A} = (6, 1)$, $\vec{B} = (1, 2)$, then $\|\vec{A} - 2\vec{B}\| =$ unit length.

- (a) 5 (b) 8 (c) 12 (d) $\sqrt{3}$

(4) In ABC : $\vec{AB} + \vec{BC} + \vec{CA} =$

- (a) $\vec{AB}$ (b) $\vec{BC}$ (c) $\vec{CA}$ (d) $\vec{O}$

(5) The vector $\vec{OB} = (3\sqrt{2}, 315^\circ)$ in the cartesian form is

- (a) $(-1, -3)$ (b) $(1, 2)$ (c) $(3, -3)$ (d) $(3, 1)$

(6) If $\vec{A} = 2\vec{i} + 3\vec{j}$, $\vec{B} = (4, k)$, are parallel vectors , then $k =$

- (a) 3 (b) 6 (c) -6 (d) 12

4 Choose the correct answer from those given :

(1) If $\vec{A} = (4, -2)$, $\vec{AB} = (3, 5)$, then $\vec{B} =$

- (a) $(7, 3)$ (b) $(1, 3)$ (c) $(-1, 7)$ (d) $(3, 7)$

(2) If C $(2, 4)$ is the midpoint of $\overline{AB}$ where A $(x, 4)$, B $(1, y)$, then $x + y =$

- (a) 1 (b) -1 (c) 7 (d) -7

(3) If the straight line : $ax - 4y + 5 = 0$ makes with the positive direction of the X-axis an angle of tangent 0.75 , then $a =$

- (a) 3 (b) -3 (c) 4 (d) -4

(4) The measure of the angle between two straight lines whose equations are $x = 3$, $y = 4$ equals

- (a) 30° (b) 45° (c) 60° (d) 90°

- (5) The length of the perpendicular drawn from the point $(0, -4)$ to the straight line $x + 5 = 0$ equals length unit.
- (a) 3 (b) 4 (c) -5 (d) 5
- (6) The equation of the straight line which passes through the origin point and the point of intersection of the two straight lines : $x = 2$, $y = 5$ is
- (a) $5x - 2y = 0$ (b) $2x - 5y = 0$ (c) $2x + 5y = 6$ (d) $5x + 2y = 0$
- (7) If $A(-3, -7)$, $B(4, 0)$, then the point C Which divides $\overrightarrow{AB}$ internally in the ratio $5 : 2$ is
- (a) $(-2, 2)$ (b) $(2, -2)$ (c) $(2, 2)$ (d) $(-2, -2)$

5 Find graphically the S.S. of each of the following :

$$x \geq 0 \quad , \quad y \geq 0 \quad , \quad x + y \leq 5 \quad , \quad x + y \geq 4$$

6 If $\vec{A} = (-3, 4)$, $\vec{B} = (6, -8)$, then find the norm of $\vec{A}$ and $\vec{B}$
 , then prove that : $\vec{A} \parallel \vec{B}$

Second Essay questions

- 1 $\vec{u} = (-3, 5)$ is the direction vector of the straight line
 $\therefore$ Its vector equation: $\vec{r} = \vec{A} + k\vec{u}$
 $\therefore \vec{r} = (3, -1) + k(-3, 5)$
 $\therefore$ The two parametric equations: $x = 3 - 3k$
 $y = -1 + 5k$
 $\therefore$ cartesian form is $\frac{y+1}{5} = \frac{x-3}{-3}$
 $\therefore 5x - 15 = -3y - 3$
 $\therefore$ The general form is $5x + 3y - 12 = 0$
- 2 $\therefore$ slope of the line $= \frac{-1}{4} \therefore \vec{u} = (4, -1)$
 $\therefore$ vector form of the equation is: $\vec{r} = \vec{A} + k\vec{u}$
 $\vec{r} = (3, -2) + k(4, -1)$

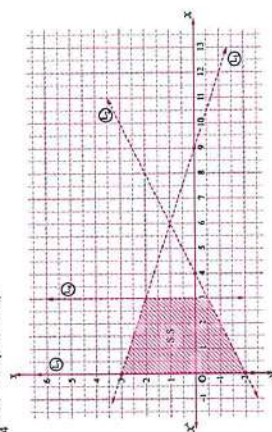
- 31 (c) 32 (b) 33 (c) 34 (d) 35 (b)
 36 (a) 37 (b) 38 (a) 39 (c) 40 (d)
 41 (a) 42 (c) 43 (d) 44 (c) 45 (d)
 46 (d) 47 (a) 48 (b) 49 (b) 50 (a)
 51 (a) 52 (c) 53 (c) 54 (b) 55 (d)
 56 (d) 57 (c) 58 (d) 59 (d) 60 (b)
 61 (c) 62 (c) 63 (d) 64 (d) 65 (c)
 66 (b) 67 (b) 68 (c) 69 (b) 70 (d)
 71 (c) 72 (b) 73 (a) 74 (c) 75 (a)
 76 (d) 77 (b) 78 (b) 79 (b) 80 (c)
 81 (a) 82 (a) 83 (b) 84 (a) 85 (b)
 86 (c) 87 (a) 88 (d) 89 (c) 90 (d)
 91 (b) 92 (a) 93 (b) 94 (c) 95 (d)
 96 (b) 97 (a) 98 (b) 99 (a)

Answers of School examinations

1 Cairo

- 1 (1) (d) (2) (b) (3) (c)
 (4) (b) (5) (a) (6) (b)
 2 (1) (c) (2) (a) (3) (b)
 (4) (a) (5) (a) (6) (b)
 3 (1) (a) (2) (a) (3) (a)
 (4) (d) (5) (c) (6) (c)
 4 (1) (c) (2) (c) (3) (d)
 (4) (b) (5) (c) (6) (d)
 (7) (d)

- 5 Draw boundary lines:
 $L_1: x + 3y = 9$ (dashed)
 Passing through $(0, 3), (9, 0)$
 $L_2: x - 2y = 4$ (dashed)
 Passing through $(0, -2), (4, 0)$
 $L_3: x = 0$ (solid)
 $L_4: x = 3$ (dashed)



The shaded region represents the S.S.

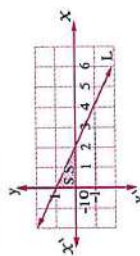
- 6 $\therefore 3\vec{M} + 5\vec{AB} = 3\vec{CB} - 2\vec{BA}$
 $\therefore 3\vec{M} = 3\vec{CB} + 2\vec{AB} - 5\vec{AB}$
 $= 3\vec{CB} - 3\vec{AB} = 3\vec{CB} + 3\vec{BA} = 3\vec{CA}$
 $\therefore \vec{M} = \vec{CA}$

2 Cairo

- 1 (1) (c) (2) (a) (3) (b)
 (4) (a) (5) (d) (6) (a)
 2 (1) (a) (2) (a) (3) (b)
 (4) (d) (5) (a) (6) (d)
 3 (1) (a) (2) (d) (3) (d)
 (4) (b) (5) (c) (6) (a)
 4 (1) (a) (2) (b) (3) (d)
 (4) (c) (5) (d) (6) (d)
 (7) (c)

- 5 $\therefore$ ABCD is a parallelogram
 $\therefore \vec{AB} = \vec{DC} \therefore \vec{B} - \vec{A} = \vec{C} - \vec{D}$
 $\therefore \vec{D} = \vec{C} - \vec{B} + \vec{A} = (3, 4) - (0, 2) + (1, 5) = (4, 7)$

- 6 $x \geq 0, y \geq 0$ represented by $\vec{OX} \cup \vec{Oy} \cup 1^{st}$ quadrant
 • Draw boundary line: $L: 2x + 4y = 4$ (solid) passing through $(0, 1), (2, 0)$



The shaded region represents the S.S.

3 Giza

- 1 (1) (c) (2) (c) (3) (c)
 (4) (d) (5) (a) (6) (d)
 (7) (c)
 2 (1) (d) (2) (b) (3) (d)
 (4) (d) (5) (a) (6) (a)
 3 (1) (b) (2) (d) (3) (a)
 (4) (a) (5) (b) (6) (a)
 4 (1) (b) (2) (b) (3) (b)
 (4) (c) (5) (a) (6) (a)

5

In ΔXYZ

$$\therefore (\overrightarrow{XY} + \overrightarrow{YZ}) + \overrightarrow{ZX} = \overrightarrow{XZ} + \overrightarrow{ZX} = \vec{0}$$

6

Draw the boundary lines

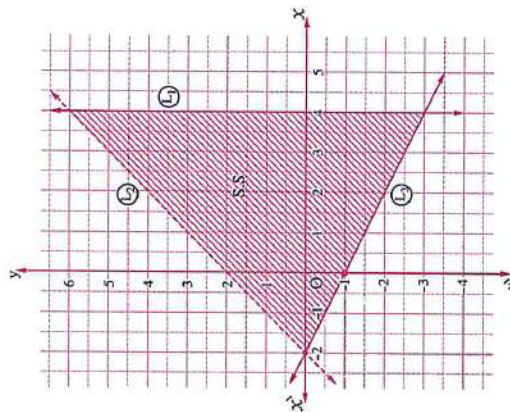
$$L_1 : X = 4 \text{ (solid)}$$

$$L_2 : Y = X + 2 \text{ (dashed)}$$

$$\text{passes through } (0, 2), (-2, 0)$$

$$L_3 : X + 2Y = -2 \text{ (solid)}$$

$$\text{passes through } (0, -1), (-2, 0)$$



The shaded region represents the S.S.

4

Giza

- 1 (1) (d) (2) (a) (3) (b)
(4) (b) (5) (b) (6) (d)
(7) (c)

- 2 (1) (c) (2) (d) (3) (b)
(4) (b) (5) (c) (6) (d)

- 3 (1) (b) (2) (c) (3) (c)
(4) (b) (5) (b) (6) (d)

- 4 (1) (b) (2) (a) (3) (b)
(4) (d) (5) (c) (6) (a)

5

$$X \geq 0, Y \geq 0 \text{ represent } \overrightarrow{OX} \cup \overrightarrow{OY} \cup 1^{\text{st}} \text{ quadrant}$$

Draw boundary lines :

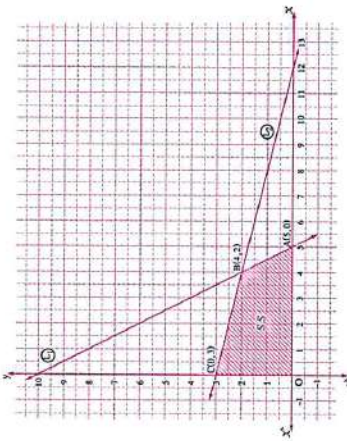
$$L_1 : 2X + Y = 10 \text{ (solid) passing through } (0, 10), (5, 0)$$

$$L_2 : X + 4Y = 12 \text{ (solid) passing through } (0, 3), (12, 0)$$

$$L_3 : X + 2Y = -2 \text{ (solid) passing through } (0, -1), (-2, 0)$$

$$L_4 : X + 2Y = -2 \text{ (solid) passing through } (0, -1), (-2, 0)$$

$$L_5 : X + 2Y = -2 \text{ (solid) passing through } (0, -1), (-2, 0)$$



The S.S. is the shaded region OABC

$$O(0, 0), A(5, 0), B(4, 2), C(0, 3)$$

$$\text{objective function } P = 2X + 3Y$$

$$[P]_O = 0, [P]_A = 10, [P]_B = 14, [P]_C = 9$$

$$\therefore \text{The maximum value} = 14 \text{ at } B(4, 2)$$

6

$$\|5\vec{A} + 3\vec{B}\| = \|5(-2, 4) + 3(3, -2)\|$$

$$= \|(-1, 14)\| = \sqrt{(-1)^2 + (14)^2} = \sqrt{197}$$

5

Alexandria

- 1 (1) (a) (2) (c) (3) (d)
(4) (a) (5) (c) (6) (c)

- 2 (1) (a) (2) (d) (3) (a)
(4) (b) (5) (a) (6) (c)

- 3 (1) (c) (2) (b) (3) (b)
(4) (c) (5) (a) (6) (a)

4

- (1) (b) (2) (a) (3) (d)
(4) (c) (5) (c) (6) (d)
(7) (a)

5

$$X \geq 0, Y \geq 0 \text{ are represented by } \overrightarrow{OX} \cup \overrightarrow{OY} \cup 1^{\text{st}} \text{ quadrant}$$

Draw the boundary lines :

$$L_1 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_2 : 2X + 4Y = 8 \text{ (solid) passing through } (0, 2), (4, 0)$$

$$L_3 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_4 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_5 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_6 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_7 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_8 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_9 : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{10} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{11} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{12} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{13} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{14} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{15} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{16} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{17} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{18} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{19} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{20} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{21} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{22} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{23} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{24} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{25} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{26} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{27} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{28} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{29} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{30} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{31} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{32} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{33} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{34} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{35} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

$$L_{36} : 3X + 2Y = 6 \text{ (solid) passing through } (0, 3), (2, 0)$$

8 El-Monofia

2 (1) (b) (2) (c) (3) (b)

(4) (c) (5) (a) (6) (b)

3 (1) (a) (2) (a) (3) (c)

(4) (b) (5) (b) (6) (b)

4 (1) (a) (2) (d) (3) (b)

(4) (b) (5) (a) (6) (c)

(7) (b)

5

The vector equation :

$$\vec{r} = (3, -1) + k(-3, 5)$$

The parametric equations :

$$x = 3 - 3k, y = -1 + 5k$$

$$\text{The cartesian equation : } \frac{y+1}{5} = \frac{x-3}{-3}$$

$$\therefore 3y + 3 = -5x + 15 \therefore 5x + 3y - 12 = 0$$

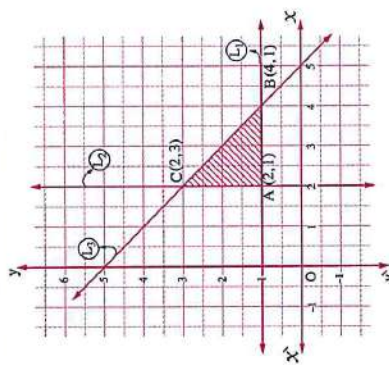
6

Draw the boundary lines :

$$L_1 : y = 1 \text{ (solid) passes through } (0, 1), (1, 1)$$

$$L_2 : x = 2 \text{ (solid) passes through } (2, 0), (2, 1)$$

$$L_3 : x + y = 5 \text{ (solid) passes through } (0, 5), (5, 0)$$



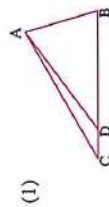
The S.S. is the shaded region ABC

where A(2, 1), B(4, 1), C(2, 3)

objective function $P = 2x + 3y$

$$[P]_A = 7, [P]_B = 11, [P]_C = 13$$

$\therefore$ The smallest value = 7 at A(2, 1)



In $\triangle ABD$:

$$\therefore \overline{AB} + \overline{BD} = \overline{AD} \quad (1)$$

In $\triangle ADC$:

$$\therefore \overline{AC} + \overline{CD} = \overline{AD} \quad (2)$$

$$\therefore 4\overline{AC} + 4\overline{CD} = 4\overline{AD}$$

By adding (1), (2) :

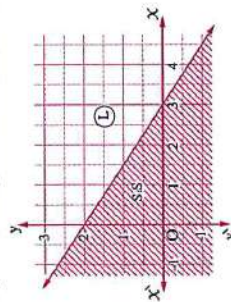
$$\therefore \overline{AB} + \overline{BD} + 4\overline{AC} + 4\overline{CD} = 5\overline{AD}$$

$$\therefore \overline{BD} = 4\overline{DC}$$

$$\therefore \overline{BD} + 4\overline{CD} = \overline{O} \quad \therefore \overline{AB} + 4\overline{AC} = 5\overline{AD}$$

6

$$L : 2x + 3y = 6 \text{ (solid) passes through } (0, 2), (3, 0)$$



The shaded region represents the S.S.

9 El-Gharbia

1 (1) (a)

(4) (c)

(2) (c)

(5) (d)

(3) (b)

(6) (b)

2 (1) (b)

(4) (a)

(2) (c)

(5) (b)

(3) (d)

(6) (d)

(7) (a)

(5) (c)

5

In $\triangle BCD$:

$$\therefore \overline{BD} = \overline{BC} + \overline{CD}$$

In $\triangle ADC$:

$$\therefore \overline{AC} = \overline{AD} + \overline{DC}$$

By adding (1), (2) :

$$\therefore \overline{AC} + \overline{BD} = \overline{AD} + \overline{DC} + \overline{BC} + \overline{CD}$$

$$\therefore \overline{AD} \parallel \overline{BC}, \frac{BC}{AD} = \frac{3}{2}$$

$$\therefore \overline{BC} = \frac{3}{2} \overline{AD}$$

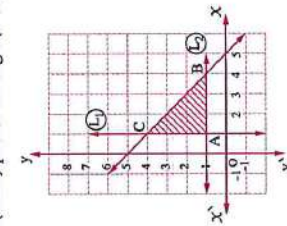
$$\therefore \overline{AC} + \overline{BD} = \overline{AD} + \frac{3}{2} \overline{AD} = \frac{5}{2} \overline{AD}$$

6

$$L_1 : x = 1 \text{ (solid) passes through } (1, 0), (1, 1)$$

$$L_2 : y = 1 \text{ (solid) passes through } (0, 1), (1, 1)$$

$$L_3 : x + y = 5 \text{ (solid) passes through } (0, 5), (5, 0)$$



The S.S. is the shaded region ABC where

$$A(1, 1), B(4, 1), C(1, 4)$$

objective function $P = 5x + 4y$

$$[P]_A = 9, [P]_B = 24, [P]_C = 21$$

$\therefore$ The maximum value = 24 at B(4, 1)

2 (1) (b)

(4) (a)

(2) (c)

(5) (b)

(3) (d)

(6) (d)

(7) (a)

(5) (c)

5

In $\triangle BCD$:

$$\therefore \overline{BD} = \overline{BC} + \overline{CD}$$

In $\triangle ADC$:

$$\therefore \overline{AC} = \overline{AD} + \overline{DC}$$

By adding (1), (2) :

$$\therefore \overline{AC} + \overline{BD} = \overline{AD} + \overline{DC} + \overline{BC} + \overline{CD}$$

$$\therefore \overline{AD} \parallel \overline{BC}, \frac{BC}{AD} = \frac{3}{2}$$

$$\therefore \overline{BC} = \frac{3}{2} \overline{AD}$$

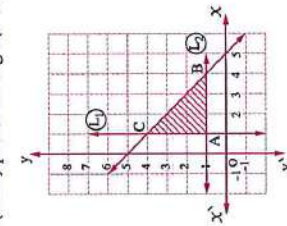
$$\therefore \overline{AC} + \overline{BD} = \overline{AD} + \frac{3}{2} \overline{AD} = \frac{5}{2} \overline{AD}$$

6

$$L_1 : x = 1 \text{ (solid) passes through } (1, 0), (1, 1)$$

$$L_2 : y = 1 \text{ (solid) passes through } (0, 1), (1, 1)$$

$$L_3 : x + y = 5 \text{ (solid) passes through } (0, 5), (5, 0)$$



The S.S. is the shaded region ABC where

$$A(1, 1), B(4, 1), C(1, 4)$$

objective function $P = 5x + 4y$

$$[P]_A = 9, [P]_B = 24, [P]_C = 21$$

$\therefore$ The maximum value = 24 at B(4, 1)

10 Suez

1 (1) (c) (2) (a) (3) (b)

(4) (b) (5) (c) (6) (a)

(7) (d)

2 (1) (c) (2) (b) (3) (b)

(4) (c) (5) (a) (6) (b)

3 (1) (a) (2) (a) (3) (b)

(4) (a) (5) (c) (6) (c)

4 (1) (c) (2) (b) (3) (b)

(4) (b) (5) (c) (6) (b)

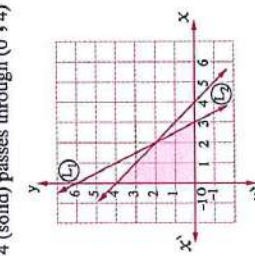
5

$x \geq 0, y \geq 0$ represents

$\overline{OX} \cup \overline{Oy} \cup 1^{st}$ quadrant

$$L_1 : 2x + y = 6 \text{ (solid) passes through } (0, 6), (3, 0)$$

$$L_2 : x + y = 4 \text{ (solid) passes through } (0, 4), (4, 0)$$



$\therefore$ The shaded region represents the S.S.

6

In $\triangle BDC$:

$$\therefore \overline{BD} = \overline{BC} + \overline{CD}$$

In $\triangle ADC$:

$$\therefore \overline{AC} = \overline{AD} + \overline{DC}$$

By adding (1), (2) :

$$\therefore \overline{AC} + \overline{BD} = \overline{AD} + \overline{DC} + \overline{BC} + \overline{CD}$$

$$\therefore \overline{BC} = 3\overline{AD}$$

$$\therefore \overline{AC} + \overline{BD} = 4\overline{AD}$$

(1)

(2)

$\therefore \overline{AC} + \overline{BD} = 4\overline{AD}$

11 Kafr El-Sheikh

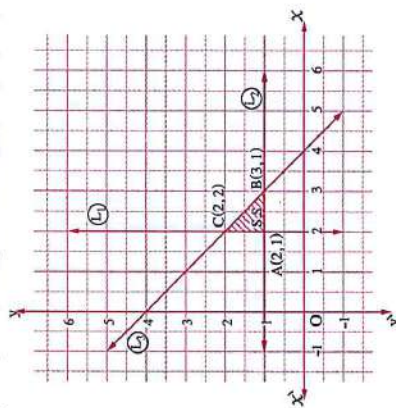
- 1 (1) (c) (2) (d) (3) (a)
(4) (c) (5) (b) (6) (d)

- 2 (1) (a) (2) (b) (3) (d)
(4) (d) (5) (b) (6) (b)

- 3 (1) (c) (2) (d) (3) (b)
(4) (b) (5) (a) (6) (a)

- 4 (1) (c) (2) (d) (3) (c)
(4) (b) (5) (c) (6) (b)
(7) (a)

- 5 $L_1: X = 2$ (solid) passes through $(2, 0), (2, 1)$
 $L_2: y = 1$ (solid) passes through $(0, 1), (1, 1)$
 $L_3: X + y = 4$ (solid) passes through $(0, 4), (4, 0)$



The shaded region ABC represents the S.S.

where $A(2, 1), B(3, 1), C(2, 2)$

objective function $P = 2X + 3Y$

$[P]_A = 7, [P]_B = 9, [P]_C = 10$

$\therefore$ The maximum value = 10 at $C(2, 2)$

6 The slope = $\frac{1 - (-3)}{5 - 2} = \frac{4}{3}$

$\therefore$ The vector equation $\vec{r} = (5, 1) + k(3, 4)$

$\therefore (X, Y) = (5, 1) + k(3, 4)$

- $\therefore$ The parametric equations: $X = 5 + 3k, Y = 1 + 4k$
 $\therefore \frac{Y-1}{X-5} = \frac{4}{3}$
 $\therefore$ The cartesian equation: $4X - 3Y - 17 = 0$

12 El-Beheira

- 1 (1) (c) (2) (d) (3) (c)
(4) (a) (5) (d) (6) (d)

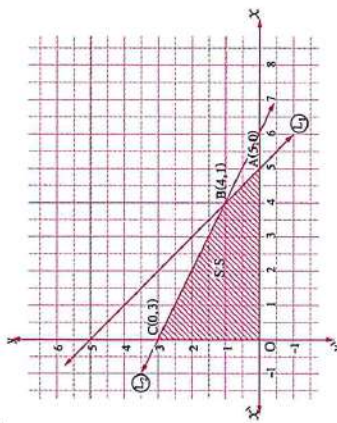
- 2 (1) (a) (2) (c) (3) (a)
(4) (a) (5) (d) (6) (b)

- 3 (1) (a) (2) (b) (3) (d)
(4) (a) (5) (a) (6) (a)

- 4 (1) (a) (2) (a) (3) (d)
(4) (b) (5) (d) (6) (c)
(7) (a)

- 5 In ΔADC :
 $\therefore \overline{AC} = \overline{AD} + \overline{DC}$ (1)
In ΔBDC :
 $\therefore \overline{BD} = \overline{BC} + \overline{CD}$ (2)
By adding (1), (2):
 $\therefore \overline{AC} + \overline{BD} = \overline{AD} + \overline{DC} + \overline{BC} + \overline{CD}$
 $\therefore \overline{BC} = 4 \overline{AD} \therefore \overline{AC} + \overline{BD} = 5 \overline{AD}$

- 6 $X \geq 0, Y \geq 0$ are represented by $\overline{OX} \cup \overline{OY} \cup 1^{st}$ quadrant.
 $L_1: X + Y = 5$ (solid) passes through $(0, 5), (5, 0)$
 $L_2: X + 2Y = 6$ (solid) passes through $(0, 3), (6, 0)$



- The shaded region OABC where $O(0, 0), A(5, 0), B(4, 1), C(0, 3)$ represents the S.S.
 $\therefore$ the objective function $R = 3X + 4Y$
 $\therefore [R]_O = 0, [R]_A = 15, [R]_B = 16, [R]_C = 12$
The maximum value = 16 at $B(4, 1)$

13 El-Menia

- 1 (1) (b) (2) (d) (3) (c)
(4) (d) (5) (a) (6) (a)
(7) (d)

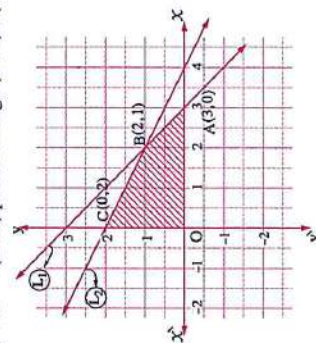
- 2 (1) (b) (2) (d) (3) (a)
(4) (d) (5) (d) (6) (d)

- 3 (1) (c) (2) (c) (3) (c)
(4) (a) (5) (d) (6) (a)

- 4 (1) (b) (2) (a) (3) (c)
(4) (b) (5) (a) (6) (c)

- 5 In ΔADC :
 $\therefore \overline{AD} + \overline{DC} = \overline{AC}$ (1)
In ΔABC :
 $\therefore \overline{AH}$ is a midpoint of $\overline{BC}$
 $\therefore \overline{AH}$ is a median
 $\therefore \overline{AB} + \overline{AC} = 2 \overline{AH}$ (2)
From (1), (2): $\therefore \overline{AB} + \overline{AD} + \overline{DC} = 2 \overline{AH}$

- 6 $X \geq 0, Y \geq 0$ are represented by $\overline{OX} \cup \overline{OY} \cup 1^{st}$ quadrant
 $L_1: X + Y = 3$ (solid) passes through $(0, 3), (3, 0)$
 $L_2: 2Y + X = 4$ (solid) passes through $(0, 2), (4, 0)$



- The shaded region OABC where $O(0, 0), A(3, 0), B(2, 1), C(0, 2)$ represents the S.S.
objective function $P = 3X + 4Y$
 $[P]_O = 0, [P]_A = 9, [P]_B = 10, [P]_C = 8$
 $\therefore$ The greatest value = 10 at $B(2, 1)$

14 Souhag

- 1 (1) (c) (2) (d) (3) (d)
(4) (b) (5) (a) (6) (b)
(7) (d)

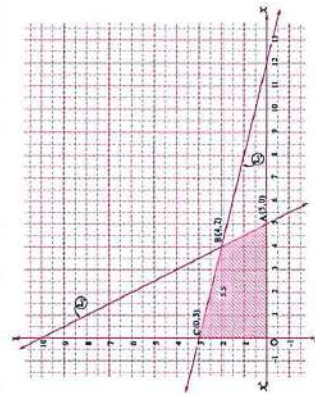
- 2 (1) (a) (2) (c) (3) (c)
(4) (b) (5) (c) (6) (b)

- 3 (1) (b) (2) (c) (3) (d)
(4) (a) (5) (c) (6) (b)

- 4 (1) (c) (2) (c) (3) (d)
(4) (d) (5) (d) (6) (c)

- 5 The slope of the straight line: $X + 3Y = 1$ is $-\frac{1}{3}$
 $\therefore$ The slope of the perpendicular straight line = 3
 $\therefore$ The required equation is:
 $\therefore Y - (-5) = 3(X - 3) \therefore 3X - 9 = Y + 5$
 $\therefore$ The general equation is: $3X - Y - 14 = 0$

- 6 $X \geq 0, Y \geq 0$ are represented by $\overline{OX} \cup \overline{OY} \cup 1^{st}$ quadrant
 $L_1: Y + 2X = 10$ (solid) passes through $(0, 10), (5, 0)$
 $L_2: X + 4Y = 12$ (solid) passes through $(0, 3), (12, 0)$



The S.S. is the shaded region OABC where

O (0, 0), A (5, 0), B (4, 2), C (0, 6)

$\therefore$ objective function : $P = 2y + 5x$

$$[P]_O = 0, [P]_A = 25, [P]_B = 24, [P]_C = 12$$

$\therefore$ The maximum value = 25 at A (5, 0)

15 Aswan

1 (1) (c) (2) (b) (3) (c)

(4) (a) (5) (d) (6) (a)

2 (1) (c) (2) (d) (3) (b)

(4) (b) (5) (a) (6) (b)

3 (1) (a) (2) (b) (3) (a)

(4) (d) (5) (c) (6) (b)

4 (1) (a) (2) (c) (3) (a)

(4) (d) (5) (d) (6) (a)

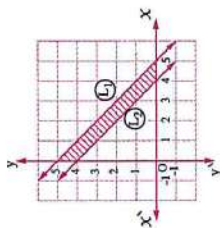
(7) (b)

5

$x \geq 0, y \geq 0$ are represented by $\overrightarrow{Ox} \cup \overrightarrow{Oy} \cup I^{st}$ quadrant

$L_1 : x + y = 5$ (solid) passes through (0, 5), (5, 0)

$L_2 : x + y = 4$ (solid) passes through (0, 4), (4, 0)



The shaded region represents the S.S.

6

$$\|\vec{A}\| = \sqrt{(-3)^2 + (4)^2} = 5$$

$$\|\vec{B}\| = \sqrt{(6)^2 + (-8)^2} = 10$$

$$\therefore (-3) \times (-8) - (4 \times 6) = \text{zero}$$

$$\therefore \vec{A} \parallel \vec{B}$$

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9

